



500 – 655 Kent Avenue North W.
Vancouver, B.C. V6P 6T7

Phone (604) 267-7805
Fax (604) 267-7806
E-Mail: info@kinetic.bc.ca
Internet: www.kinetic.bc.ca

K-1000 Fingerprint Authentication Evaluation Kit



Overview

Kinetic Sciences' K-1000 Fingerprint Authentication Evaluation Kit is aimed at embedded applications developers requiring a stand-alone complete fingerprint authentication system. The unit consists of a single credit card sized board containing KSI's optical fingerprint sweep-scan sensor, a TI 6211 DSP, and Kinetic Sciences' proprietary 1-to-few matching technology. Typical applications include:

- Physical Access Control
- Building security systems
- Time and Attendance systems
- Physical User authentication
- Dual factor authentication systems

The kit is packaged as an ergonomically designed USB desktop sensor and is provided with evaluation viewer software. The sensor is capable of being operated in several modes:

- *Desktop USB Sensor*; software controls scanning and PC-based fingerprint matching¹
- *Embedded Sensor*; evaluation software allows display of images while fingerprint matching occurs on-board within the sensor
- *Stand-alone*; battery operated utilizing the USB cable and battery pack² for fully autonomous operation utilizing on-board imaging and matching.

The K-1000, as an embedded system, is capable of connecting to a variety of peripheral devices such as a keypad and display, smart-card reader, or other peripherals through an on-board high-speed serial link.

General Specifications

	Standard
Size of PCB	84mm x 54mm
Voltage requirement	3.8 v
Battery Power – 1 yr (6/day)	6 v (4 AA cells)
Current requirement	650 mA (scan) < 100 µA (idle)
USB Interface	Drivers for Microsoft Win98, 2K, Me, XP
General serial I/O	80 Mbits/second
RAM	8 MB
Flash Memory	2 MB

Sensor Head Assembly Module Specifications

Sensor Type	CMOS Dual Linear Array
Format	900 x 2 pixels
Imaging Width	15.21mm
Imaging Resolution	500 - 1000 dpi
FIFO Buffer	2048 bytes
Readout rate	40 MHz
Flags	Polling & Interrupt
I/O	8 bit parallel
SPI Compatible Serial I/F	Resolution adjustment FIFO push/pull toggle Analog gain control
Power Consumption	150mW @ 3.3 V Sensor 600 mW LED's
Temperature Range	0 to 60 °C
Package size	22.2 mm x 20.3 mm chip on board PCB

¹ Provided with Cogent Systems® Fingerprint Matching Evaluation software

² Battery pack may not be provided with all evaluations – utilizes 4 'AA' high energy batteries

On-board matching module

Please note these specifications apply only to Kinetic Sciences' proprietary embedded on-board fingerprint matcher. PC-based fingerprint matcher specifications will vary with manufacturer. Please contact Kinetic Sciences for further information.

Matcher type	Minutiae based
Match time	0.85 seconds typical
Template size	< 1 kb
Verification Database	1000 records max.
False Reject Ratio (FRR)	10^{-3}
False Acceptance Ratio (FAR)	10^{-5}

Technology

Kinetic Sciences fingerprint sensor technology is comprised of the following major components:

- A proprietary CMOS silicon sensor chip;
- A proprietary optical module, that focuses the fingerprint image onto the sensor chip;
- A patented algorithm that “reconstructs” a fingerprint image from a moving image of the finger;
- DSP microprocessor based control circuit that controls the function of the sensor, and processes the fingerprint image;
- A fingerprint matching algorithm that extracts relevant information and “matches” one image against another.
- Battery management for autonomous operation on 4 – 6 ‘AA’ batteries
- TouchScan fingerprint scan start

As a finger is swept across the sensor platen, the optical module projects a high contrast strip of the fingerprint image onto the sensor chip (CMOS dual linear array). The image is scanned by the sensor chip in a manner similar to a fax machine scanning a sheet of paper. While the finger is being scanned, control circuitry compensates for variations in finger speed, pressure and finger dryness to optimize the image output throughout the scan.

A patented reconstruction algorithm takes the output from the sensor chip and constructs a geometrically correct fingerprint image. The resulting image can be passed to the matcher algorithm, which extracts salient features of the image, and can store these “feature sets” in a database. The “feature sets” are the unique features of a person’s fingerprint and newly extracted “feature sets” can be matched against stored sets to compare one image against another.

Comparative advantages

Kinetic Sciences’ technology has a number of important advantages and benefits versus its competition.

Low Cost: utilizes 1/10th the silicon area compared to some competing silicon area array sensors. Silicon area is a major cost driver of fingerprint sensors and cost is particularly relevant in high-volume commercial applications.

Ease of Integration: A single credit card-sized board contains all the hardware and software to image a finger, extract information, and match against an on-board database. The board is capable of being battery powered and is ideal for residential access control. Networking extensions required for commercial markets are easily integrated.

Small Size: the design of the chip-sized main sensor module ensures it can be implemented as a separate ribbon-connected component from the main board, or as an embedded system within small handheld devices. This provides great flexibility in product design.

Capture Performance: At up to 1000 dpi, KSI's technology provides the highest available performance in a commercial³ fingerprint sensor assuring even small fingers (such as those from children and Asian women) can be correctly identified

Image Resolution Performance: KSI's technology produces true 8-bit gray-scale images. Sophisticated algorithms dynamically compensate for changes in finger dryness and pressure during a scan, producing consistent image darkness from scan to scan.

Ruggedness: The design provides for ultra-low susceptibility Electro-Static Discharge (ESD) and impact, two common causes of silicon sensor failures in the field. It also requires no routine cleaning or maintenance common with other optical sensors.

About Kinetic Sciences

Kinetic Sciences Inc. (KSI) was founded in 1991 to develop sophisticated robotic and machine vision technology primarily for aerospace applications. The company's work in "broom-scan" sensing for aerial reconnaissance and robotic fingertip vision led to the development of its optical scan fingerprint sensor technology.

In 1997, the company became entirely focused on fingerprint biometric identification and security. Kinetic Sciences' patented technology is unique to its market; the technology is inexpensive to produce, rugged and compact enough for mobile applications, and produces the industry's highest image quality.

Kinetic Sciences has completed development of a custom silicon chip, embedded sensor module and a DSP-based complete fingerprint capture and matching system. The company is focused on licensing opportunities with OEM manufacturers in the physical access and mobile commerce markets. KSI is focused on commercial development of its core products in 2001, and growing the value model through extensions into complete fingerprint security solutions.