DALLAS
SEMICONDUCTOR

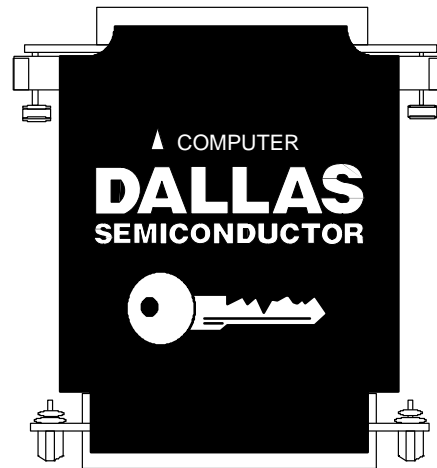# DS1405
Authorization Module

FEATURES

- Compatible with ISA, EISA, and MCA personal computers

- Self-powered to operate with desk top as well as notebook computers

- Access timing automatically scales to variable computer clock rates

- Can be used in conjunction with other parallel port resident products

- Supports DOS, Extended DOS and Windows 3.1

- Tamper resistant
    - Attempts to discover contents by mechanical disassembly can cause automatic memory erasure
    - Attempts to discover contents by electrical stimulation are met with decoy responses

- Guaranteed unique 48-bit serial number for absolute traceability

- Three independent secure read/write data partitions of 384 bits each

- 512-bit read/write scratchpad assures data integrity for key updates

- Supports multiple application or hierarchical privilege systems

PACKAGE OUTLINE

DESCRIPTION

The DS1405 Authorization Module is a hardware-based, software protection scheme which consists of a unique micro chip "key" and special access software. In conjunction with embedded "locks" in a software developer's application, it protects intellectual property by controlling the right to execute rather than the right to copy the software. Three secure data areas of 384 bits each are accessed by their own unreadable, 64-bit password. The 512-bit scratchpad can be used as a holding register for building new secure keys dynamically. Each partition in the part is uniquely addres-

sable at the byte level. The secure data areas are guarded by an intelligent response generator to thwart potential attackers.

A 48-bit, guaranteed unique serial number is provided to serialize diskettes and protected programs and to facilitate tracking DS1405 units in the field. The serial number also facilitates access to multiple DS1405 Authorization Modules on a single port.

FUNCTIONAL OVERVIEW

The DS1405 Authorization Module provides software developers with a unique serial number and multiple, alterable memory partitions for use in software protection systems. The organization of the DS1405 is presented in Figure 1. The features of the DS1405 are accessible through low-level interface software called the Access System which is required for operation of the security device. The Access System uses the unique serial number to transparently address all DS1405 Authorization Modules on the parallel port of the host computer.

Each 384-bit secure data area is prefaced by a 64-bit identification field and an unreadable 64-bit password. If any one of the secure keys is presented with its valid password from the host application, the contents of that key's secure data area will be returned. If the secure key is presented with an invalid or false password, the intelligent response generator will return a seemingly normal response that is unique to that false access. This keeps the determined software pirate from being able to concentrate on matching query/response sequences. By using seemingly random data in both the password and secure data fields and by making many false accesses for each valid access, the developer can overwhelm even the most technically sophisticated attacker.

Initiating a reprogram sequence to a secure key immediately clears the contents of its ID, password and secure data fields. Similarly, physical tampering with the DS1405 can result in the immediate destruction of memory contents.

DS1405 AUTHORIZATION MODULE MEMORY ORGANIZATION Figure 1

Part Type 8 bits	Serial Number 48 bits	CRC Value 8 bits

Scratchpad
512 bits

Secure Key 0

ID 0	64 bits
Password 0	64 bits

Secure Data 0
384 bits

Secure Key 1

ID 1	64 bits
Password 1	64 bits

Secure Data 1
384 bits

Secure Key 2

ID 2	64 bits
Password 2	64 bits

Secure Data 2
384 bits

PARALLEL PORT INTERFACE (PPI)

The DS1405 Authorization Module uses a proprietary hardware interface to the host's parallel port. In conjunction with the Access System software, the PPI transparently provides a reliable connection. A subset of PPI functionality follows.

● Supports uni- or bi-directional ports

● Access timing scales to the host computer and can be continuously recalibrated

● RFI filter compensation

● All lines of the DB-25 connector are passed through to support "cascading" with other devices

● Resolution of port conflict with print spoolers and Windows 3.1 applications

POWER REQUIREMENTS

The DS1405 Authorization Module is powered by an on-board lithium source. This allows the security system to function on a wider range of parallel printer ports than would be possible if the device had to borrow power from the host. The lithium source used is nominally rated at 130 mA hours with a shelf life of ten years. The planned life of the Authorization Module is 1.2 billion transactions of 512 bits each.

INSTALLATION AND OPERATION

The DS1405 Authorization Module is attached to IBM or compatible personal computers by the parallel printer port. If a printer is configured in the system, the module resides between the printer cable and the PC. Install the DS1405 by plugging the male 25-pin D connector (marked COMPUTER) into the female printer port. The top and bottom retaining screws should be tightened to avoid accidental disconnection. Next, plug the printer cable into the female connector of the DS1405 and tighten the top and bottom retaining screws on the cable. An attached printer is not required. However, if a printer is attached, it should be powered up and on-line. The DS1405 Authorization Module can be used in conjunction with multiple Dallas Semiconductor and/or other parallel port-resident products.

SOFTWARE

Software support is available through the DS1410K Developer's Kit.