Smart Card Types

Serial Memories

Serial Memory IC's for chip cards offer an economical way to manage application data using a standard, non-proprietary I2Cbus protocol. Serial Memory IC's are used in a wide range of applications for off-line storage of data, including medical, loyalty, membership, vending and many others. I2Cus memories are often used in applications were larger amounts of data need to be stored on a chip. Memory sizes vary from 1Kilo Byte too 4 Mega bits.

Unlike protected memories, serial memories do not offer read or write protection. And although the I2Cbus protocol is fairly common, it is not compatible with PCSC drivers. To use them you will need to use the proprietary reader drivers normally available from the reader manufacturer.

Protected Memories

Protected Memory IC's for chip cards offer an economical way to manage and secure your application data. Protected memories are economical & frequently the best choice for a wide range of applications including loyalty, membership, ID, vending, and many others were some data protection is required.

Unlike serial memories, protected memory chips allow the user to write protect data stored on the card. Each protected memory chip design employs several different security features to protect card data. Protected memories are common in applications were the fraud potential does not require encryption and the amount of data to be stored is small.

With the exception of Atmel's new AT88SC1616C, protected memories all use proprietary protocols developed on a chip by chip basis before the PCSC standard for smartcard reader drivers was developed. This means that protected memories are not normally compatible with smartcard readers using PCSC drivers. However, you will find that most reader manufactures have written proprietary drivers for customers using protected memories.

Because the protocol changes from one protected memory to another, finding development tools generally means first deciding on a reader and then asking its manufacturer for the development tools you will need. All the memories listed here are compatible with the ACR 20 reader which can be purchased in conjunction with the ACR AC Developers Kit.

Microcontrollers

Unlike memory cards, microcontrollers need a card operating system (COS) to manage resources. Until recently, getting access to a COS was a serious "barrier" for applications developers because the only commercially viable COSs available were from card manufacturers who developed their own applications. Developers were left to rely on competitors for smartcard products and expertise. VCT has changed that by focusing our resources to provide application developers with the software tools needed to compete.

Contactless

Smart card which transfers data using radio frequency technology via a transmitter and receiver

Serial Memories

The **AT24C02SC** provides 2048 bits of serial, electrically-erasable and programmable read-only memory (EEPROM) organized as 256 words of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C04SC** provides 4096 (512 bits x 8) bits of serial, electrically-erasable and programmable read-only memory (EEPROM) organized as 512 words of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C08SC** provides 8192 bits of serial, electrically-erasable and programmable read-only memory (EEPROM) organized as 1024ords of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C16SC** provides 16384 bits of serial, electrically-erasable and programmable read-only memory (EEPROM) organized as 2048 words of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C32SC** provides 32,768 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 4096 words of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C64SC** provides 65,536 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 8192 words of 8 bits each. The chip is optimized for use in smartcard applications where low-power and low-voltage operation may be essential.

The **AT24C128** provides 131,072 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 16,384 words of 8 bits each. The devices are optimized for use in smartcard applications where low power and low-voltage operation may be essential.

The **AT24C256** provides 262,144 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 32,768 words of 8 bits each. The devices are optimized for use in smartcard applications where low power and low-voltage operation may be essential.

The **AT24C512SC** provides 524,288 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 65,536 words of 8 bits each. The devices are optimized for use in smartcard applications where low power and low-voltage operation may be essential.

Protected Memories

AT88SC102   **EEPROM:**   **1024 Bits**

A low-cost, synchronous, secure memory integrated circuit, designed for use in prepaid and loyalty smartcard applications. 1,024-bits of serial Electrically Erasable and Programmable Read only Memory within one application zone, plus 64 bits in a code protected zone. Additional EEPROM memory and security logic provide security for smartcard applications.

AT88SC1001   **EEPROM:**   **1024 Bits**

A low-cost, synchronous, secure memory integrated circuit, designed for use in prepaid and loyalty smartcard applications. 1,024-bits of serial Electrically Erasable and Programmable Read only Memory within one application zone, plus 64 bits in a code protected zone. Additional EEPROM memory and security logic provide security for smartcard applications.

AT88SC153   **EEPROM:**   **2048 bits**

2,048 bits of serial EEPROM memory organized as one configuration zone of 64 byte and three user zones of 64 bytes each. This device is optimized as a "secure memory" for multi-application smart card markets, secure identification for electronic data transfer or for components in a system without the requirement of an internal microprocessor.

AT88SC1608   **EEPROM:**   **17,408 bits**

The AT88SC1608 provides 17,408 bits of serial EEPROM memory organized as one configuration zone of 128 bytes and eight user zones of 256 bytes each. This device is optimized as a "secure memory" for smartcard applications without the requirement of an internal microprocessor.

AT88SC1616C

NEW! The AT88SC1616C member of the CryptoMemory family is a high performance secure memory providing 16 Kbits of user memory with advanced security and cryptographic features built in. The user memory is divided into 16 zones, each of which may be individually set with different security access rights or combined together to provide pace for 1 to 16 data files. The AT88SC1616C provides high security, low cost and ease of implementation for smartcard applications without the need for a microprocessor operation system.

SLE 4406S/06SE

Was designed for applications in prepaid telephone cards. The chip consists of an EEPROM memory of 112bits, a ROM of 16 bits and a control/security unit. Today this chip is used primarily in legacy systems and not generally specified for new applications.

SLE 4428

Similar to the SLE4418 but additionally to the above functions this version has Programmable Security Code verification logic. All the memory, except for the PSC, can always be read. The memory can be written or erased only after PSC verification. After eight successive incorrect entries the error counter will block any subsequent attempt at PSC verification and hence any possibility to write and erase. This IC is one of the most popular in the industry.

SLE 4442

Intelligent 256-Byte EEPROM with Write Protect Function and Programmable Security Code (PSC).This chip contains and EEPROM organized 1024 x 8 bit offering the possibility of programmable write protection for each byte. Reading of the whole memory is always possible. The memory can be written and erased byte by byte.

SLE 4436 & SLE 4436E

Designed for applications in prepaid telephone cards. the Chip consists of an EEPROM memory or 221 bit, a ROM of 16 bits, a control/security unit and a special computing unit for chip authentication. The shaded blocks in the block diagram (Figure 3) contain the enhanced features of SLE 4436/36E compared to SLE 4406/06E.

SLE 5536S & SLE 5536SE

Designed for applications in prepaid telephone cards. The chip consists of and EEPROM memory of 221 bit, a ROM of 16 bits, a control/security unit and a special computing unit for chip authentication.

Microcontrollers

An extremely easy to use and powerful operating system that allows users to program smartcards in BASIC.

With an OSX for Visual Basic, API's for C and Delphi, this OS gets you to market fast. Available in 1KB, 2KB, and 8KB EEPROM sizes.

Aptura Java Card® platform-based smart card runs Java technology-based applications in the form of byte-code. These are loaded into the memory zone of the smart card's microprocessor where they are run by the virtual machine.

The executable code is platform independent so that any card incorporating a Java Card[a] technology-based interpreter can run the same application. Available in 16KB and 32KB EEPROM sizes on Hitachi chips.

MULTOS® ("Multiple Operating System") is an OS that allows multiple application programs to be installed and reside separately and securely on a smartcard.

Each program is isolated by the operating system so that no application interferes with another. Where earlier smartcard systems did not allow new applications to be installed or old ones deleted, MULTOS® makes this possible. Updates or patches can also be installed as needed.

Each application is platform-independent due to the implementation of a virtual machine. Developers write applications for MULTOS® smartcards using the MULTOS® Executable Language (MEL). Available in 16KB and 32KB EEPROM sizes from Hitachi and Infineon chips.

Contactless

SLE44R35S/ Mifare

Intelligent 1-Kbyte EEPROM with Interface for Contactless Transmission, Security Logic and Anti-collision according to the MIFARE – System

SLE 55R04

Intelligent 320-Byte EEPROM with Contactless Interface complying with ISO/IEC 1443 Type A and Security Logic.

SLE 55R04

Intelligent 320-Byte EEPROM with Contactless Interface complying with ISO/IEC 1443 Type A and Security Logic.

SLE 55R08

Intelligent 1280-Byte EEPROM with Contactless Interface complying with ISO/IEC 1443 Type A and Security Logic.

SLE 66CL160S

Dual Interface 16-bit Security Controller with 32-Kbyte ROM, 1280 bytes RAM and 16-Kbyte EEPROM

Software

Smartcard application development, once the domain of smartcard manufactures, is now open to any independent programmer.

If you have a smartcard idea, but don't know where to start, let VCT be your smartcard guide. We can equip you with development tools to develop your own products. Whatever your needs, VCT gives you the freedom to create.

Memory card applications with are no problem with the AC- Developers Kit. Need the power of a true Smartcard with fully programmable Microcontroller? VCT supports the industries best with software tools for the leading smartcard operating systems including: ACOS, BasicCard™, JAVA Card™, and MULTOS™.

Memory Cards

Applications based on memory cards are most easily developed using development tools specific to a given smartcard reader. Because the protocol changes from one protected memory to another, finding development tools for them generally means first deciding on a reader and then asking its manufacturer for the development tools you will need. All the memories listed on our pages are compatible with our ACS readers and the AC Kit for development of memory card applications.

Memory V. Smartcard

A memory based 'chip card' is similar to a floppy disk and is often available with security logic to protect its contents. A 'smartcard' is similar to a computer. It can execute commands and has as little or as much security as its applications require.

AC-KIT

AC-KIT for Memory Chip Cards

The AC-KIT is one of the most valuable tools available for anybody interested in smart card technology; the AC-Kit is a complete package containing all the vital components required for smart card application development. Each kit contains 2 smartcard readers, 20 test cards, and a CD-ROM containing all the necessary drivers, software development libraries, user manuals, evaluation software, demo programs and sample code.

Smartcard Operating Systems

Unlike memory cards, smartcards need an operating system to manage their microcontrollers. Until recently, the only commercially viable card operating systems available were proprietary and available only from large systems houses that also manufactured cards for their own applications.

This meant that independent application developers without their own card manufacturing had to rely on a competitor for access to the smartcard market. VCT has helped change that by focusing the resources of a world-class card manufacturer on providing application developers with the smartcard products, services, and software tools they need to compete with the large system houses.

Our customers worry less because they know their smartcards and development tools come from a company that is relying on them for success.

Proprietary V. Open	A 'Proprietary Card OS' is one owned and distributed on a single source basis by a card manufacturer who is also in the business of developing smartcard applications.
Virtual Machine V. ROM	A ROM based card OS allows developers to call predetermined functions contained in ROM that can not be changed after manufacturing. ACOS1 is a ROM based card OS. A Virtual Machine based card OS, allows you to write and download executable code into the EEPROM of the smartcard. Examples include the BasicCard, Aptura, and MultOS.

ACOS1

ACOS1 Smartcard Operating System   ACOS1 is a ROM based card OS that is ISO 7816-3 T=0 compliant. It provides features like a 8kByte EEPROM memory for application data, compliance with ISO 7816-3, T=0 protocol, DES and MAC capabilities, Five secret codes + Issuer Code, PIN is changeable by card holder, Key pair for mutual authentication, Session Key based on random numbers, & Linear files with fixed record length.

BasicCard Smartcard Operating System   BasicCard is a robust and powerful operating system for smartcards. It is the first smartcard programmable in BASIC. It is easy to use, open to anyone, requires no special training, and is competitively priced. All the tools you need to be a serious competitor are included in the BasicCard Toolkit which supports ISO 7816-3 T=1 protocol, AES, DES, 3DES, and RSA.

Aptura Smartcard Operating System   Unlike memory cards, smartcards need an operating system to manage their Microcontrollers. Until recently, the only 'commercially-viable' card operating systems available were from large systems

SmartDeck for MULTOS Smartcard Operating System   SmartDeck is a complete high-level language development system for MULTOS applications combining all the features that you need to develop compact, efficient programs. The system is integrated, so all the components work smoothing together to help get your applications up and running quickly, making it the most advanced product of its kind.