

System Design Considerations

Planning Your System

Smart card system design requires advance planning to be successful and to avoid problems. It is highly recommended that you graphically diagram the flow of information for your new system. The first question is always: Will the card and system transact information, or value, or both? If it stores keys or value i.e. gift certificates or sports tickets, greater design detail is required than in data-only systems. When you combine information types on a single card, other issues arise. The key to success is not to over-run the system with features that can confuse users and cause problems in management. We recommend that you phase-in each feature set as each one is working. To properly implement a functional smart card system you should be able to answer the following questions. **NOTE:** These are only general guidelines, provided as a basis for your individual planning. Many other steps may be involved and are not mentioned here. If you are looking for a finished smart card application, CardLogix can recommend it's Smart Partners for a quality solutions.

Basic Set-Up

1. Is there a clear business case? Including financial and consumer behavior factors?
2. Will the system be single or multi-application?
3. What information do I want to store in the cards?
4. How much memory is required for each application?
5. If multi-application, how will I separate different types of data?
6. Will card data be obtained from a database? Or loaded every time?
7. Will this data concurrently reside on a database?
8. How many cards will be needed?
9. Are card/infrastructure vendors identified? What are the lead times?

Security

1. What are the security requirements?
2. Does all, or only some of the data need to be secure?
3. Who will have access to this information?
4. Who will be allowed to change this information?
5. In what manner shall I secure this data i.e. encryption, Host passwords, card passwords/PINs or all of these?
6. Should the keys/PINs be customer or system-activated?
7. What form of version control do I want?

Value Applications

1. Should the value in the cards be reloadable or will the cards be disposable?
2. How will I distribute the cards?
3. How will cards be activated and loaded with value?
4. What type of card traceability should I implement?
5. What is the minimum and maximum value to store on each card?
6. Will there be a refund policy?

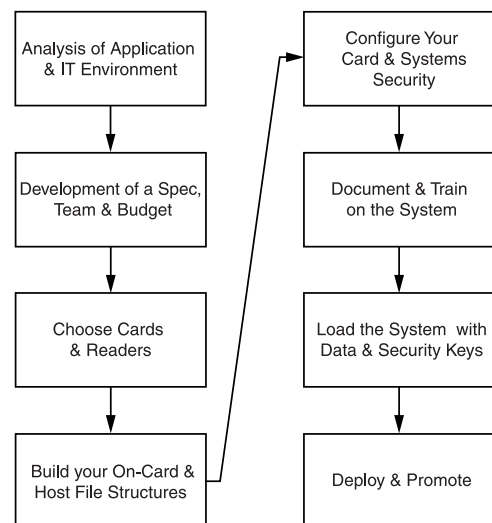
General

1. How many types of artwork will be included in the issuance?
2. Who will do the artwork?
3. What is needed on the card? For example signature panels, Mag-Stripe, Embossing etc.

Deployment Recommendations

- A. Establish clear achievable program objectives
- B. Make sure the organization has a stake in the project's success and that management buys into the project
- C. Set a budget
- D. Name a project manager
- E. Assemble a project team and create a team vision.
- F. Graphically create an information, card and funds-flow diagram
- G. Assess the card and reader options
- H. Write a detailed specification for the system
- I. Set a realistic schedule with inch-stones and mile-stones
- J. Establish the security parameters for both people and the system
- K. Phase-in each system element, testing as you deploy
- L. Reassess for security leaks
- M. Deploy the first phase of cards and test, test
- N. Train the key employees responsible for each area
- O. Set-up a system user manual
- P. Check the reporting structures
- Q. Have contingency plans should problems arise
- R. Deploy and announce
- S. Advertise and market your system

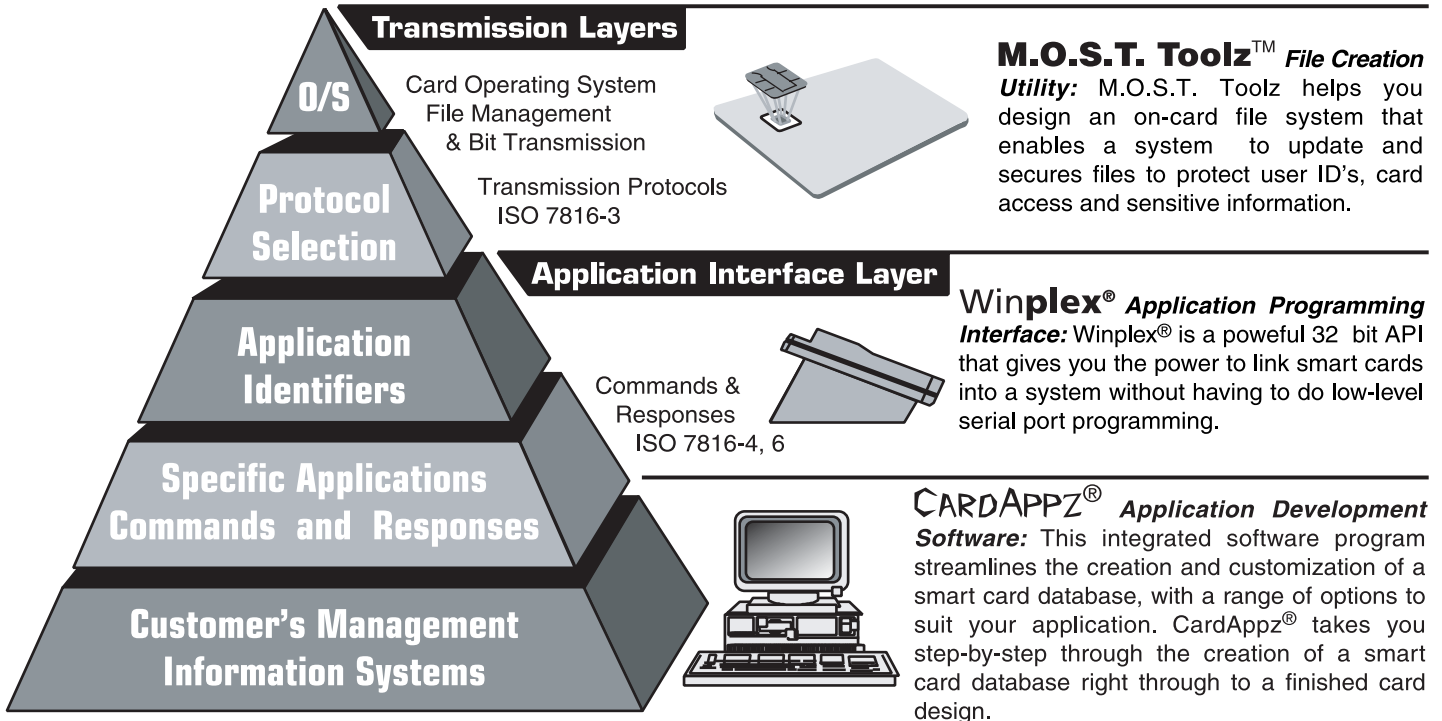
Implementation Steps



Development Tools

Implementation of a smart card system involves both hardware and software elements. Among the technological aspects of such systems are the possible combining of on-line and off-line approaches to maintaining record integrity and processing information. CardLogix provides low-cost high-performance tools to help intergrate your system on time and within budget. **Smart Toolz™** and **M.O.S.T. Toolz™**, **Trakplex™** and **Movie Gold** were created to help a business build a sophisticated secure smart card system.

Typical Card System



Smart Toolz™ is a comprehensive suite of software and hardware that includes everything you need to develop PC-based smart card applications. **Includes:**

- 5 different Memory Smart Cards
- High Performance Serial Port Reader/Writer
- Power Supply and Adaptors
- CardAppz Software
- Winplex® API
- Programming Examples
- Demo/Reader Configuration Utility

M.O.S.T. Toolz™ is for multifunction and/or high security smart card applications. This low-cost kit is an add-on to the Smart Toolz® Application Development Kit and features a utility for on-card file creation and encryption that works with the M.O.S.T. family of microprocessor-based cards.

M.O.S.T. Toolz® also comes with the powerful Winplex® API, Smart Card Service Provider for PSSC, five microprocessor smart cards for system design and file setup, Visual Basic, and C++, programming examples and full documentation. It is designed for Windows 95/98, NT 4.0, 2000 and XP.

Smart Card Production & Printing Considerations

Available Card Printing Methods

Printing Method	Features	Min. Order
Lithography	Four color process with optional Pantone® color matching. Full bleed available on both sides. Customer can supply their own artwork as negatives or resolution independent computer files.	1000
Screen Printing	Up to seven colors. No bleeds allowed. Customer can supply their own artwork as negatives or resolution independent computer files.	200
UltraGraphics™	Up to 13 individual colors, each applied in a single pass at 300 dpi. Customer can supply art as a resolution independent computer file.	50
Photo I.D.	Individual photos printed on each card. Usually used in combination with one of the above. Customer must supply a database of individuals and their associated photos in Bitmap format and at a minimum of 150dpi.	5000

Card-Specific Printing/Security Options

Card Styles: All cards are available in the CR-80, GSM SIM/SAM and Keychain styles and are constructed of durable PVC plastics. See page 4 for specifications and dimensions of each card style.

Signature Panels: A writeable panel for a users signature or other hand written data adding additional security. See page 4 for signature panel options and dimensions.

Scratch Off Panels: Only available to the UltraGraphics™ printing method and can be 10 digits long. Used to protect pre-loaded PIN's and/or other customer-specific data.

Laser Engraving/Indenting: Laser Engraving and Indenting can be applied to the card design. A 5,000 card minimum order applies.

Tipping & Embossing: Card embossing is available in two point sizes and one font style. "Tipping" color is applied to the embossed type for clarity, you specify either gold or silver.

Holograms & Overlays: Available in either metallic foil or polyester overlays to increase security. Special tooling charges apply.

Card Punching/Die Cutting: Tether or badge holes can be made to accommodate clasps. See page 4 for badge hole location and specifications.

Card Coupons

CardLogix offers removable coupons on our magnetic stripe and/or Smart Cards. Promotions combined with other card functions can offset or replace the cost of the whole card adding to your bottom line.

Barcode Printing: The following barcodes are supported, others are available upon special request;

Code 39 Plus	HIBC Code 39 Plus
Code 39	Codabar
EAN 13	EAN 9
UPC A	Code 128
Code 128 Func 1	Code 128 Func 2
Code 128 Func 1 & 2	

Motion Graphics Printing: 3D or Motion graphics are available with a Linear Optical design. A minimum order requirement of 25,000 cards applies.

Mailing, Card Programming, Encoding & Personalization

CardLogix can program your card orders, including Mag-Stripe encoding and software loading. Other options include fulfillment i.e. include affixing cards to special carriers, for example promotional collateral. You can also order cards serialized and inserted into envelopes that can be stamped and mailed. Card lots can also be individually sleeved or shrink-wrapped for non-secure delivery.

Mag-Tape: Can be encoded to various industry specifications. Our Magnetic Stripe cards can be encoded to the specifications set by leading manufacturers of automated banking equipment for tracks 1, 2, and 3.

Initialization: Formats the card to accept data. This can include information such as a manufacturer ID code and date code.

Data Loading: CardLogix can load most types of data, such as identification records, health histories, etc.

Certificate Key Loading: For security applications, CardLogix can load the card with digital certificates, transport and encrypted keys.

Value Loading: Any form of value, including tokens. (Proof of Authorized Issuance will be required).

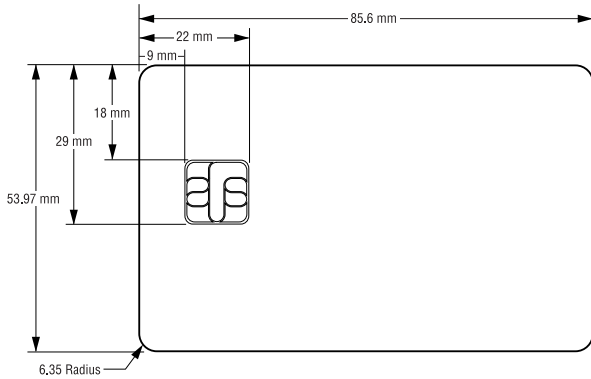
Security Options

Cryptography: CardLogix provides simple and effective fine-level security with a Double-Blind Key Escrow methodology that protects sensitive, everyday data.

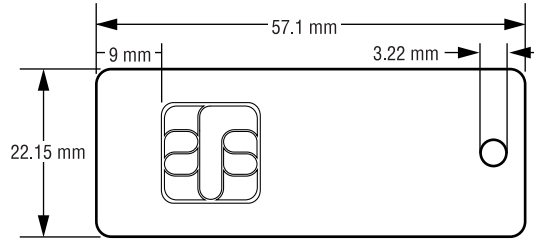
Tamper-evident packaging: At an extra charge, CardLogix will provide special labeling, boxing, wrapping, and shipping to prevent unauthorized access to cards.

Smart Card Dimensions & Specifications

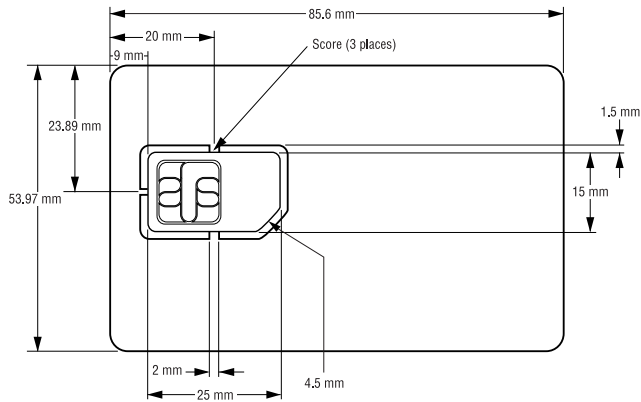
CR-80 Card



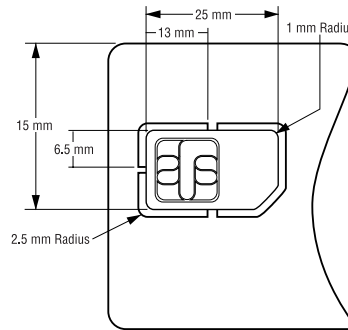
Keychain Card



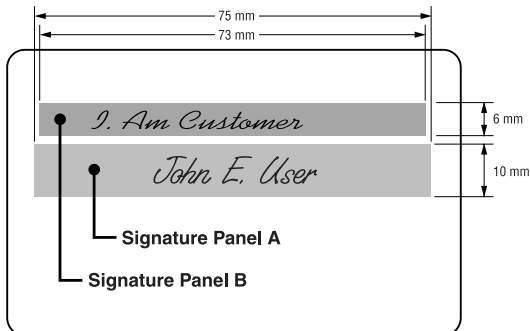
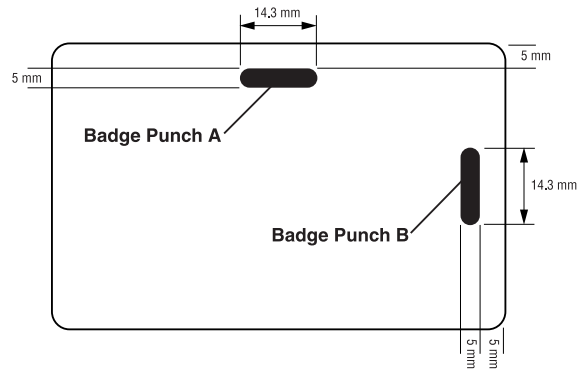
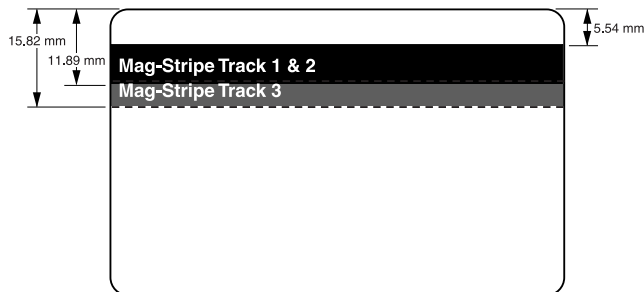
GSM SIM/SAM Card



GSM SIM/SAM Card (cutout)



Smart Card Dimensions & Specifications



NOTE: Signature panels can be placed on any area of the card back provided it does not overlap any other element on the front or back of the card.

M.O.S.T.™ Card Product Selector (Microprocessor based cards)

CardLogix Part Number	Product Type	Product Functionality/Applications	Security Features	User-Data Memory (EEPROM)	Communication Protocols	Max. Supply Current
CLXSU004KK4/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	0.5K Bytes	T=0	3 milliamps
CLXSU004KC0/T=0ED*	Microprocessor	Multifunction, High security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and DES Encryption	0.5K Bytes	T=0	3 milliamps
CLXSU008KK5/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	1K Bytes	T=0	3 milliamps
CLXSU016KK6/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	2K Bytes	T=0	3 milliamps
CLXSU004KK7/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	8K Bytes	T=0	3 milliamps
CLXSU128KK8/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	16K Bytes	T=0	3 milliamps
CLXSU128KK9/T=0-/c	Microprocessor	Multifunction, Strong security, Purse/Wallet, Stored Value, and E-Commerce	Authentication, Purse, and Proprietary Encryption	32K Bytes	T=0	3 milliamps
CLXSU128KJ8/T=0	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication & Purse	16K Bytes	T=0	3 milliamps
CLXSU128KJ8/T=1	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication & Purse	16K Bytes	T=1	3 milliamps
CLXSU128KJ8/T=0ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	16K Bytes	T=0	3 milliamps
CLXSU128KJ8/T=1ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	16K Bytes	T=1	3 milliamps
CLXSU256KJ8/T=0ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	32K Bytes	T=0	3 milliamps
CLXSU256KJ8/T=1ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	32K Bytes	T=1	3 milliamps
CLXSU512KJ9/T=0ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	64K Bytes	T=0	3 milliamps
CLXSU512KJ9/T=1ED	Microprocessor	Multifunction, High security, Purse/Wallet, GSM, TV Set-top, E-Commerce & Campus	Authentication, Purse, DES, and 3DES Encryption	64K Bytes	T=1	3 milliamps

M.O.S.T.™ Cards are supported by all industry standard T=0 and T=0 smart card readers and terminals.
M.O.S.T.™ Cards also support the PC/SC API. CardLogix also supports the JAVA Card O.S. and Multos Operating Systems, available upon request.

Java Card O.S. Product Selector (Java 2.1.1)

CardLogix Part Number	Product Type	Product Functionality/Applications	Security Features	User-Data Memory (EEPROM)	Communication Protocols	Max. Supply Current
CLXSU512KJ9/MC-JVG	Microprocessor	Cellular/PDA/GSM, Multifunction, High security, Purse/Wallet, Stored Value, and E-Commerce	GSM 11.1.1, 1.1.12, Authentication, Purse, DES, 3DES	64K Bytes	T=0, GSM	3 milliamps
CLXSU512KJ9/MC-JV	Microprocessor	Banking, I.D. Security, E-Commerce, Purse/Wallet, Stored Value.	SHA-1 Authentication, Purse, DES, 3DES, and RSA(2048)	64K Bytes	T=0	3 milliamps

R.F./Contactless Smart Cards

CardLogix Part Number	Product Type	Product Functionality/Applications	Security Features	User-Data Memory (EEPROM)	Communication Protocols	Max. Supply Current
CLXSR001KP1	Contactless	Multifunction, Building Access, Transportation, Purse/Wallet, Stored value, and E-Commerce	Anti-collision	192 Bytes	Mifare	13.56 MHz

All CardLogix cards are available with a contactless card body. We support Mifare and Prox frequencies as a standard offering.

Memory Smart Card Product Selector

CardLogix Part Number	Product Type	Product Functionality/Applications	Security Features	Issuer-Data Memory (ROM)	User-Data Memory (EEPROM)	Communication Protocols	Supported Readers	Maximum Supply Current
CLXSA001KA1	Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Host Based Only	N/A	1Kbits	I ² C	A,I,L,K,E	3 milliamps
CLXSA002KA2	Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Host Based Only	N/A	2Kbits	I ² C	A,I,L,K,E	3 milliamps
CLXSA004KA6	Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Host Based Only	N/A	4Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA008KA7	Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Host Based Only	N/A	8Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA016KA8	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	16Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA032KA9	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	32Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA064KA3	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	64Kbits	I ² C	A,I,L,K,E	3 milliamps
CLXSA256KA5	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	256Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA512KD5	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	512Kbits	I ² C	A,I,L,K	3 milliamps
CLXSA001MD1	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	1 Megabit	I ² C	A,I,L,K	3 milliamps
CLXSA004MF1	Memory	Data/Record storage, Health informatics, Loyalty, Conventions, Digital receipts	Host Based Only	N/A	4 Megabits	SPI	N/A	3 milliamps
CLXSA001KK1	Smart Memory	Access Control, Stored Value, Data/Record Storage, Health informatics, Loyalty, Conventions, Digital Receipts	On card password protection for both read & write functions	64Kbits	1Kbits	7816 Synchronous	A,L,S	3 milliamps
CLXSA001KK2	Smart Memory	Access Control, Stored Value, Data/Record Storage, Health informatics, Loyalty, Conventions, Digital Receipts	On card password protection for both read & write functions	64Kbits	1.5Kbits	7816 Synchronous	A,L,S	3 milliamps
CLXSA001KK3	Smart Memory	Access Control, Stored Value, Data/Record Storage, Health informatics, Loyalty, Conventions, Digital Receipts	On card password protection for both read & write functions	64Kbits	2Kbits	7816 Synchronous	A,L,S	3 milliamps
CLXSA008KB3	Smart Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Security code, Fuse lock write protect	16 bits	8K bits	7816 Synchronous	A,I,K,E	10 milliamps
CLXSA008KB4	Smart Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Security code, FTransport code, Fuse lock write protect	16 bits	8Kbits	7816 Synchronous	A,I,K	10 milliamps
CLXSB000KB2	Smart Memory	Stored value, Laundromats, Telephones, Prepaid systems, Tokens, Dollars or Points	Security logic, Transport code, Fuse lock write protect	56 Bits	32 bits	7816 Synchronous	A,I,L,V,K	3 milliamps
CLXSB002KB5	Smart Memory	Small records storage, Loyalty, Conventions, Digital Receipts	Security code, Fuse lock write protect	N/A	2 bits	7816 Synchronous	A,K,M,S,L,I	5 milliamps
CLXSB000KB6	Smart Memory	Stored value, Laundromats, Telephones, Prepaid systems, Tokens, Dollars or Points	High security authentication SKE with anti-tearing	185 bits	36 bits	7816 Synchronous	A,I,L,V,K	5 milliamps

Winplex supported readers for Smart Cards and Memory cards;

A=Axiohm

I=Innovonics

K=Towitoko

L=Cardcom

M=SCM

S=I.D. Tech

Quality

CardLogix Corporation is absolutely committed to providing defect free products and services to our customers in partnership with equally committed suppliers and authorized dealers.

CardLogix

Corporate Office (USA)

16 Hughes

Irvine, California 92618

Ph: (949) 380-1312 • Fax: (949) 380-1428

sales@cardlogix.com • <http://www.cardlogix.com> • <http://www.smarttoolz.com>