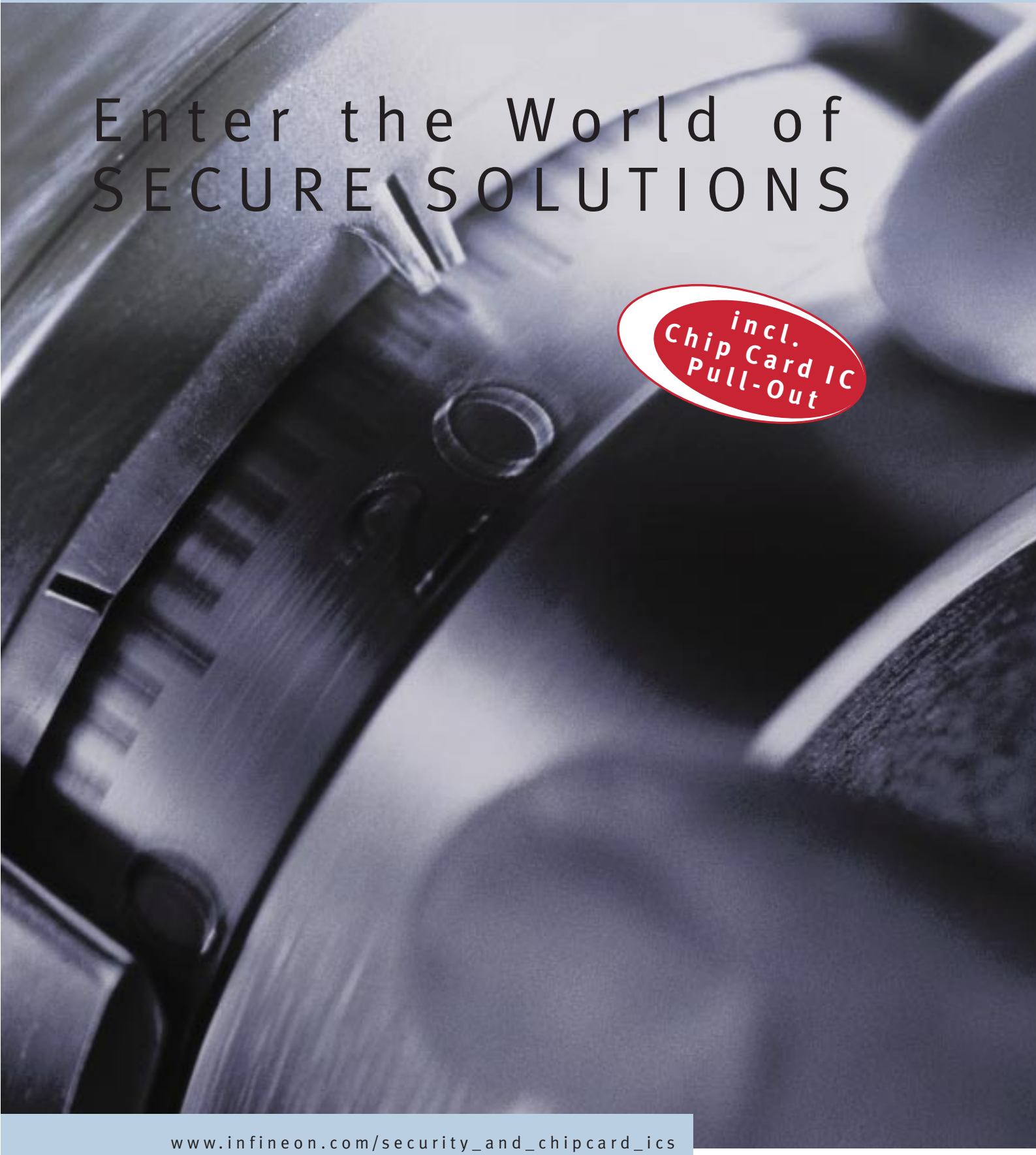
Enter the World of SECURE SOLUTIONS



www.infineon.com/security_and_chipcard_ics

Infineon technologies

Never stop thinking.

Always one step

Your premier partner on the way to global success

TODAY'S world is characterized by the rapidly growing number of technological innovations. But how do you know which of these is only a fashion craze and which will become the basis for tomorrow's reality? Successful businesses need a competent partner who will help them make the right decisions, decisions that are both visionary and futureproof.

ONLY a few years ago, smart cards were just a fascinating idea. Today, they have become a fact of life. From the very beginning, Infineon Technologies has shaped their development with innovative applications and comprehensive solutions. In fact, in 1978 Infineon Technologies (former Siemens Semiconductors) introduced the world's first smart card IC. Since then, Infineon Technologies has been the leader in smart card technology and proved this again by offering the market the very first 32-bit crypto-controller for smart card applications.

Smart card technology will open up new dimensions for the information society of the 21st century. For instance, smart cards will be used to make network computing safe and secure, for protection against unauthorized access to valuable information and for positive identification in highly sensitive applications. To make sure they are secure, Infineon Technologies develops the most advanced ICs and then puts them to the test with standard certification bodies and professional hackers before they are released onto the market.

Not only the number of smart card applications increase, but it will also be possible to integrate several applications on just a single card. For example, combined electronic purse

AHEAD

and telephone card applications will offer both versatility and convenience. Infineon Technologies' new chip generation already displays the performance levels necessary for such multiapplication cards. Service providers operating on diverse platforms may now join forces to offer highly beneficial solutions to the end user of the cards. This will greatly improve public acceptance of smart card technology.

Furthermore, new developments will help to overcome the use of Personal Identification Numbers. By using Infineon Technologies' FingerTIP™ IC technology, smart card ICs will be able to access all sorts of instruments that require identification.

In the near future, smart card technology will be the heart of numerous sectors. It will be used in areas as diverse as public and private transport applications, computer networks in information and communication environments, in addition to banking and governmental purposes. This extensive implementation will make smart card IC technology a major economic driving force for modern industrial regions.

Infineon Technologies is your preferred partner if you want to stay at the leading edge of this development.

Infineon Technologies advanced product list:

PAYMENT AND E-BUSINESS

Security comes first in banking cards. This is an area where Infineon Technologies can satisfy highest requirements with its innovative ICs, offering convincing solutions for the most varied applications.

Safe and easy financial transactions through innovative Infineon solutions

When money and finance are involved, security is of the highest concern. Through innovative Integrated Circuit (IC) products, Infineon Technologies offers solutions for a wide range of potential applications.

Credit and Debit Cards

Millions of credit and debit cards are in circulation all over the world. They will be gradually replaced by smart cards by the end of 2005 because financial institutions worldwide are committed to reducing the high fraud rates of magnetic strip cards. Smart card technology from Infineon offers numerous smart card controllers to safeguard against this danger.

E-Purse Cards

Throughout Europe and Asia, thousands of these cards are already being used instead of small cash. Already using smart card technology, these cards are efficient and secure, replacing small amounts of cash in machines, pay phones, parking meters and other applications. The hardware architecture of the semiconductor chips makes these cards highly secure.

E-Commerce

The use of computers and telecommunication networks to conduct, manage and execute business is growing daily. E-commerce, though, can be risky business. Lack of authentication, integrity and confidentiality have plagued many e-commerce applications. Through secure hardware components, Infineon paves the way to secure, easy-to-use e-commerce solutions for tomorrow's Internet and mobile commerce applications.

Security at a Higher Level

Infineon security and chip card IC products provide unique performance, high memory capacity and built-in security architecture. They are positioned well for many finance and e-commerce applications with contact, contactless and USB interfaces. With advanced security features like a Random Number Generator (RNG) and Cyclic Redundancy Check (CRC) module, our products are setting the new standard of excellence for PKI applications and encryption purposes. With years of expertise in 8-bit and 16-bit smart card controller development, Infineon will soon introduce the next generation of products with a dedicated 32-bit smart card CPU.

Infineon holds numerous international security certifications. The first to present crypto-controllers certified on an ITSEC Level E4 high, the company continues to demonstrate its position at the forefront of secure IC technology.

Overview

COMMUNICATION AND MULTIMEDIA

Infineon Technologies offers ICs which allow secure and cost-effective solutions for a wide variety of different telecommunication functions.

Infineon Technology adds value and security to mobile communications

Let's face it. The world is on the move. Projections indicate that there will be one billion mobile phone users by 2002. Mobile phones will continue to change people's lives in ways we cannot yet fully foresee. But with increased numbers of users, security becomes an even more dominant concern.

Infineon Technologies is taking the worry away while helping provide greater value and more user benefits.

SIM, the Key to Mobile Technology

The Subscriber Identification Module (SIM) is the key to secure mobile phone communications. Starting as a smart card for authentication and security in GSM networks, the SIM card carries the subscriber profile and network data. It can be inserted in any GSM phone. Functionality has been enhanced through several generations of product improvements.

Now more than a Phone

Today's SIM cards can store application programs which can allow network operators to offer subscribers a wide range of services which add value, profits and help a company differentiate itself from competitors. Phones are now interactive terminals used for shopping, sending and receiving messages, and accessing information such as weather forecasts, travel information and even directions to restaurants.

A Phone Plus Net Connection

With the introduction of WAP and I-Mode technology, the world can now be connected to the Internet through a cell phone. This provides an ever-expanding bounty of possibilities – even mobile commerce.

Even Streaming Video

The UMTS system, which adopted the SIM card concept independent of the network technology, will provide enough local bandwidth to support a variety of new and exciting services like streaming video or multimedia games for mobile phones. Infineon is already proceeding with ways to provide security and integrity to these systems.

Infineon Technologies works diligently to provide new and advanced solutions for mobile communications and deliver the benefits of security, efficiency and trust to this expanding technology.

Assisting in the smooth, secure transition from analog to digital television

The television industry is in a state of radical change. The introduction of digital technology to TV makes an array of new and improved services possible for viewers. Among other benefits, digital television can provide:

- Better quality picture
- Wider selection of channels
- More targeted service approach for broadcasters
- Interactive TV
- Electronic commerce options
- Digital storage of content
- Internet access
- Multimedia potential

Security Concerns are Standard

Secure conditional access for consumers has always been a concern of broadcasters. Security controllers, either in smart card format or in standard packaging, have long been used in all kinds of Pay TV systems. But the advent of digital technology poses new critical issues.

Protecting Content and Commerce

With digital technology, copy protection of content is a matter being seriously addressed by the industry. To provide viewers with e-commerce services, secure solutions for validation and authentication of access and transactions must be fully developed. This involves deploying PKI infrastructures and other technologies.

Infineon Security Solutions

As the leading provider of secure semiconductors, Infineon Technologies provides solutions for all digital television problems. Our security ICs can be employed as streamciphers, providing copy protection in applications. Our security controllers – some of them certified up to ITSEC Level E4 High – are used in a variety of conditional access systems and banking applications. Infineon also has the flexibility and expertise to tailor a solution to your specific needs. Our customized approach considers your company's unique needs and situation and finds the most effective solution. Please contact us for further information.

Secure Networking – the key application of the next century

Due to significant efforts of major IT companies to increase smart card utilization, it probably won't be long until every PC is shipped with a smart card reader. All issuers will take advantage of the underlying security of the smart card to extend relationships from the physical world to the virtual world. Smart card technology will allow individuals to protect their privacy while card issuers will be able to ensure that only valid customers access services.

Secure and cost-effective wired communications solutions

There are nearly 1.5 billion telephone cards sold around the world each year. These cards are used instead of cash and replace expensive collect calls in pay phones and other phones worldwide. They are versatile, popular and being used in new ways every day. In some countries these cards can be used to pay taxi fare or buy a soft drink. Infineon offers a complete family of chip cards offering the versatility, flexibility and security necessary to meet the growing needs of the industry.

An array of products for easy, secure communication:

Non-Authenticating Chip Cards (SLE 4406S)

This is the simplest method for replacing coins or magnetic strip cards. In these systems, the card type, number, chip and card producer can be checked by the terminals. Though the cards are not authenticated in the process, it is still possible to recognize stolen cards by checking against a blacklist.

Eurochip Cards (SLE 4436)

This family of cards provides a higher level of security. A secret card-specific key and algorithm enables authentication between chip cards and security modules. Using a challenge-response procedure, the cards are accepted by pay phone's or vending machines.

Eurochip 2 Cards (SLE 5536)

In applications using a prepaid card which decreases in value as the card-holder uses it, this product offers the function of transferring values.

It is secured by an electronic signature and offers the possibility for multi-authentication.

Eurochip IMEM Products

These products provide the highest level of security. They contain the new 1.2 CMOS technology, which is on the leading edge of secure memory technology.

Operating on either a 3 or 5V power supply, they fulfill the low-power requirements of line-powered pay phones. Active shielding and advanced security mechanisms offer increased protection against both physical and electrical attacks.

Security Modules (SAM)

Today's chipcard readers can incorporate one or more security modules. These modules enable the authentication process between Eurochip Cards and SAM, or between SAM and a centralized management system. The SAM terminal validates the identity of the sending entity through the authentication process before any data or software can be sent.

Personalization Systems

The secret keys for user cards and security modules must be created and managed stringently. Infineon offers personalization services for smaller customers as well as high-volume customers who want to have in-house systems under their own control.

Infineon products offer a solid, uninterrupted line of security throughout the entire chain of communication, ranging from user chips through security modules to personalization systems.

Overview

HEALTHCARE AND IDENTIFICATION

Infineon Technologies comprehends the requirements of the public health sector and has responded with a full range of made-to-measure Smart Card ICs.

Secure and efficient Smart Card Technology for citizen ID Cards

In the information age, more and more governments on national, regional and local levels are following the lead of the private sector and making it possible for citizens to link electronically to public services, tax authorities, social service agencies, health agencies and other departments and officials. For this type of efficient service to become acceptable, security and trust is of paramount importance.

A Pan-European Initiative

The chip card with electronic signature capability is being suggested to link all Europeans. Such a network will be an immense challenge. Yet the usage of chip cards in different national governments is already taking place on a large scale. More than 150 million cards are already in use throughout Europe.

Growing Worldwide Potential

More than 250 million people are using chip cards for secure access to government services, health care, social security benefits, drivers licenses and personal identification. The potential for far wider distribution is immense.

Smart Card Control and Healthy Accountability

Through the use of Smart Card Technology, both efficient accounting and controlled distribution of health services can be achieved. This technology can also enable the use of health cards across national borders. The card can be a life-saving tool when experiencing a health emergency while traveling in other countries.

Fast, Safe Decoding of Medical Information

Quick access to medical or health information can be of vital importance. With the Health Professional Card, based on Infineon Technologies' security crypto-controller, fast and safe decoding of information is assured.

An Array of Made-to-Measure Smart Card Options

Infineon knows what governments need and what citizens will trust. The company provides a full range of made-to-measure Smart Card ICs, all with secure access control. They provide flexibility, accountability and security. Infineon has developed a reputation for setting the standard for IC technology. Each product is designed to fit unique needs and applications.

Not for Government Only

The same technology that benefits the diverse access levels and authorization needs of governments can benefit many other organizations and institutions as well. Large-scale operations like colleges, corporations, airports and military facilities can also benefit from the efficiency, flexibility and security of Smart Card technology. Special security measures in highly sensitive areas of industry, R & D and administration can also benefit from a custom-tailored Smart Card solution.

TRANSPORTATION

The reduction in stop times and costs are the main benefits for passengers and transportation authorities. A broad product range, compliant to ISO 14443, covers the complete solution from single-trip tickets all the way to a multiapplication season ticket. More than 30 million commuters worldwide benefit from the advantages of smart cards.

ACCESS CONTROL

Whether it is a matter of diverse access levels and authorization in large-scale operations like airports, or special security measures in highly sensitive areas of industry, R & D and administration, smart card technology provides the perfect solution.

Security

INFINEON Technologies Security Memories combine excellent value for money and highest security levels. They are the ideal solution for sensitive applications as found in telecommunication, identification or healthcare environments. One highlight of the Infineon Technologies

	CONTACT BASED				
Features	**SLE 4406S**	**SLE 4436**	**SLE 5536**	**SLE 6636**	**SLE 7736**
	Telecom IC Classic	**Eurochip I**	**Eurochip II**	**Eurochip 66**	**Eurochip 77**
Product Description	Intelligent 128 bit	Intelligent 237 bit	Intelligent 237 bit	Intelligent 237 bit	Intelligent 237 bit
	EEPROM counter	EEPROM counter	EEPROM counter	EEPROM counter	EEPROM counter
Counter	>20.000 count units	>20.000 count units	>20.000 count units	>20.000 count units	>20.000 count units
	–	Support of anti-tearing	Support of anti-tearing	Support of anti-tearing	Support of anti-tearing
ROM	24 bit	24 bit	24 bit	24 bit	24 bit
PROM	72 bit	177 bit	177 bit	177 bit	177 bit
EEPROM	32 bit	36 bit	36 bit	36 bit	36 bit
Security Features	Security logic,	High security	High security	High security	High security
	Irreversible chip	authentication	authentication	authentication	authentication
	coding,	with 1 or 2 keys,	with 1 or 2 keys,	with 1 or 2 keys,	with 1 or 2 keys,
	Transport key*	Security logic,	Cipher block chaining,	Optional cipher	Optional cipher
	–	Irreversible chip	Security logic,	block chaining,	block chaining,
	–	coding,	Irreversible chip	Security logic,	Card trash mechanism,
	–	Transport key*	coding,	Irreversible chip	Security logic,
	–	–	Transport key*	coding,	Irreversible chip
	–	–	–	Transport key*,	coding,
	–	–	–	Dedicated CMOS	Advanced sensors,
	–	–	–	security technology	Dedicated CMOS
	–	–	–	–	security technology
Min. Write/Erase Time	3 ms	3 ms	3 ms	3 ms	3 ms
Operating Voltage	5 V	5 V	5 V	5 V	3–5 V
Max. Supply Current	1 mA	5 mA	5 mA	1 mA (typ. 300 µA/5 V VDD)	1 mA (typ. 300 µA/5 V VDD)
Ambient Temperature	-40…+80°C	-35…+80°C	-35…+80°C	-40…+80°C	-40…+80°C
Endurance	100.000	100.000	100.000	100.000	100.000
Retention Time, at least	30 years	10 years	10 years	30 years	30 years
Package	Module M3	Module M3	Module M3	Module M3	Module M3
	Die	Die	Die	Die	Die
Tools	EVA-kit	EVA-kit	EVA-kit	EVA-kit	EVA-kit
Applications	Prepaid phone card	Prepaid phone card,	Prepaid phone card,	Prepaid phone card,	Prepaid phone card,
	–	Vending	Vending	Vending,	Vending,
	–	–	–	Pay-TV	Pay-TV

* Transport key: used for secure transport; used as PIN in later applications
** Security code: manufacturer can be identified with a unique chip serial number

Memories

Security Memory offer is the new SLE7736 IC Eurochip 77. It features an intelligent 237 bit EEPROM counter with security logic, high security authentication, card trash mechanism and a dedicated CMOS security technology (IMEM).

By the beginning of 2001 Infineon Technologies shipped its three billionth Security Memory IC.

	CONTACT BASED				
SLE 4404	**SLE 4466**	**SLE 4432**	**SLE 4442**	**SLE 4418**	**SLE 4428**
E-Purse	**Crypto Purse**	**DataCarrier**	**DataCarrier**	**DataCarrier**	**DataCarrier**
Intelligent 416 bit	Intelligent 515 bit	Intelligent 256 Byte	Intelligent 256 Byte	Intelligent 1 kByte	Intelligent 1 kByte
EEPROM	EEPROM counter	EEPROM	EEPROM	EEPROM	EEPROM
208 count units,	>120.000 count units	–	–	–	–
64 times reloadable	–	–	–	–	–
16 bit	24 bit	–	–	–	–
144 bit	219 bit	32 bit	32 bit	32 bit	32 bit
256 bit	272 bit	256 Byte	256 Byte	1024 Byte	1024 Byte
Security logic,	High security	Byte protection,	Security code**,	Byte protection,	Security code**,
Security code**,	authentication,	Irreversible chip	Byte protection,	Irreversible chip	Byte protection,
User memory	Cipher block chaining,	coding	Irreversible chip	coding	Irreversible chip
protection,	Response counter,	–	coding,	–	coding,
Irreversible chip	Security logic,	–	Security logic,	–	Security logic,
coding,	Security code**,	–	Transport key*	–	Transport key*
Transport key*	Irreversible chip	–	–	–	–
–	coding,	–	–	–	–
–	Transport key*	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
5 ms	3 ms	2.5 ms	2.5 ms	5 ms	5 ms
5 V	5 V	5 V	5 V	5 V	5 V
3 mA	10 mA	10 mA	10 mA	10 mA	10 mA
-35...+80°C	-35...+80°C	-35...+80°C	-35...+80°C	-35...+100°C	-35...+100°C
100.000	100.000	100.000	100.000	100.000	100.000
10 years	10 years	10 years	10 years	10 years	10 years
Module M2	Module M2	Module M3	Module M3	Module M2	Module M2
Die	Die	Die	Die	Die	Die
EVA-kit	EVA-kit	EVA-kit	EVA-kit	EVA-kit	EVA-kit
Subscriber card,	Subscriber card,	Health insurance,	Health insurance,	Health insurance,	Health insurance,
Electronic purse,	Electronic purse,	Loyalty, Member card,	Loyalty, Member card,	Loyalty, Member card,	Loyalty, Member card,
Access control	Access control	Electronic ticketing	Electronic ticketing	Electronic ticketing	Electronic ticketing

Security Memories

CONTACTLESS ICs are the products of choice for all applications that require easy and convenient user identification without the need for physical contact of the card with a read/write device. Typical fields of use are in access control as well as in automatic fare collection for public transport and toll collecting systems.

The Infineon Technologies Security and Chip Card ICs division has offered smart card ICs with contactless interface for more than five years now which have been proved millionfold field efficiency. Infineon Technologies is the only manufacturer of smart card ICs that offers contactless technology for both its security memories and security controllers.

				CONTACTLESS	
Features	**SLE 55R01**	**SLE 55R02**	**SLE 55R04**	**My-d 10 S/SRF55V10S**	**SLE 55R08**
Product Description	Intelligent 160 Byte EEPROM for contactless cards –	Intelligent 320 Byte EEPROM for contactless cards –	Intelligent 770 Byte EEPROM for contactless cards –	Intelligent 1 kByte EEPROM with CL interface for smart labels –	Intelligent 1280 Byte EEPROM for contactless cards –
Memory organisation	Up to 16 sectors fully configerable	Up to 16 sectors fully configerable	Up to 16 sectors fully configerable	Up to 16 sectors fully configerable	Up to 16 sectors fully configerable
Counter	Up to 65536 units Support of anti-tearing	Up to 65536 units Support of anti-tearing	Up to 65536 units Support of anti-tearing	Up to 65536 units Support of anti-tearing	Up to 65536 units Support of anti-tearing
Operating Frequency	13.56 MHz	13.56 MHz	13.56 MHz	–	13.56 MHz
Standard ISO/IEC	14443 Typ A	14443 Typ A	14443 Typ A	15693	14443 Typ A
EEPROM	160 Byte	320 Byte	770 Byte	1 kByte	1280 Byte
Security Features	Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management	Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management	Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management	Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management	Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management
Distance (read/write)	0...10 cm –	0...10 cm –	0...10 cm –	0...70 cm (depending on system)	0...10 cm –
Data rate	106 kbit/s	106 kbit/s	106 kbit/s	26 kbit/s	106 kbit/s
Anticollision	yes	yes	yes	yes	yes
Ambient Temperature	-25...+85°C	-25...+85°C	-25...+85°C	-25...+85°C	-25...+85°C
Endurance	100.000	100.000	100.000	100.000	100.000
Min. Retention Time	10 years	10 years	10 years	10 years	10 years
Package	Module MCC2 Die	Module MCC2 Die	Module MCC2 Die	Inlay Die –	Module MCC2 Die
Tools	CR EVA-kit	CR EVA-kit	CR EVA-kit	Demo-kit	CR EVA-kit
Applications	Automatic fare collection, Electronic purse, Access control	Automatic fare collection, Electronic purse, Access control	Automatic fare collection, Electronic purse, Access control	Asset management Track and trace Security	Automatic fare collection, Electronic purse, Access control

* Transport key: used for secure transport; used as PIN in later applications
** The Mifare™ trademark is owned by its proprietor and used by Infineon Technologies under license

Security Controllers

SLE 55R16	SLE 44R35S
Intelligent 2560 Byte EEPROM for contactless cards	Intelligent 1 kByte EEPROM for contactless cards
–	Mifare™**
Up to 16 sectors fully configerable	16 fixed sectors
	–
Up to 65536 units	–
Support of anti-tearing	–
	–
13.56 MHz	13.56 MHz
14443 Typ A	14443 Typ A
2560 Byte	1k Byte
Transport key*, Unique serial number, Mutual authentication with 64 bit keys, Hierarchical key management	Transport key*, Unique serial number, Mutual authentication with 48 bit keys – –
0...10 cm –	0...10 cm –
106 kbit/s	106 kbit/s
yes	yes
-25...+85°C	-25...+85°C
100.000	100.000
10 years	10 years
Module MCC2	MCC2
Die	Bumped die
CR EVA-kit	CR EVA-kit
Automatic fare collection, Electronic purse, Access control	Automatic fare collection, Electronic purse, Access control

THE smart card controller segment of Infineon Technologies comprises various product families offering on-chip security all the way.

The **44 FAMILY** plays a prominent role in virtually every relevant smart card project worldwide. With more than 200 million units sold, 44 products are well-proven in GSM and banking applications. The 44-series was used in the first banking applications using smart cards. Today, it offers an excellent price-performance ratio.

The **66 FAMILY** features significantly higher performance, very high memory capacity and extremely low power consumption. It targets at high security, high performance applications for mobile communications, banking, healthcare, pay TV and access control. Offering processing power and flexibility, 66 products provide a platform for the launch of genuine multi-application cards. The SLE66CX160S was the world's first 16-bit cryptocontroller for smart chip card applications. This was the first microcontroller ever certified ITSEC E4. With its advanced security features – like true random number generator (RNG), cyclic redundancy check (CRC) module.

The **66P FAMILY** enters a new field with a very advanced 0.25/0.22µm CMOS technology. The small die size allows bigger memory sizes and shorter transaction time. An additional MMU (Memory Management Unit), PLL and DES accelerator are added to the standard features of the 66 family. The instruction set of the 66P family is compatible with the 66 family.

66P products are a proven multiapplication platform for performance buyers. Up to now three members of the family have achieved ITSEC E4 High. The latest controller of the family, the SLE66CX322P, offers a new dimenstion of smart card application with a supply voltage range from 1.62V–5.5V and will be certified after common criteria EAL 5 High.

The **11 FAMILY** is made up of products which are tailored for specific applications and therefore use features from different product families.

The **88 FAMILY** will offer highest performance combined with a most innovative security concept and will enable secure and customized multi-application and multitasking. Based on years of expertise in the 8-bit and 16-bit smart card controller business, Infineon Technologies is already developing the next generation with a dedicated 32-bit smart card CPU.

For offering high capacity at any time Infineon installed a silicon foundry process for most products of SLE 66CxxS and SLE 66CxxP family. Silicon foundry products offer same functionality and quality as products coming from Infineon fabs. These products are signed by the suffix **"U"** at the end of the product name. A new package M5 will be available for all the silicon foundry products.

Security

GENERAL FEATURES

All controller ICs contain a PROM of 32 Byte. They have a serial interface and offer an internal programming voltage for EEPROM. The data retention time is 10 years minimum.

The 44- and 66P families offer an endurance of 500.000 cycles. The 44 family is equipped with a CMS

Features	SLE 11C001S	SLE 22C05S	SLE 44C20S/U	SLE 44C80S/U	SLE 66C40S	SLE 66C160S/U
Product Description	Security Controller	Security Controller	Security Controller	Security Controller	Security Controller	Security Controller
User-ROM	31.5 kByte	7.5 kByte	15 kByte	15 kByte	31.5 kByte	31.5 kByte
EEPROM	16 kByte	512 Byte	2 kByte	8 kByte	4 kByte	16 kByte
RAM	1280 Byte	128 Byte	256 Byte	256 Byte	1024 Byte	1280 Byte
CPU	16 bit	16 bit	8 bit	8 bit	16 bit	16 bit
Crypto Coprocessor	–	–	–	–	–	–
Clock (int.)	1–5 MHz	1–5 MHz	1–5 MHz	1–5 MHz	1–5 MHz	1–5 MHz
Operating Voltage	2.7 V–5.5 V	2.7 V–5.5 V	2.7 V–5.5 V	2.7 V–5.5 V	2.7 V–5.5 V	2.7 V–5.5 V
Max. Supply Current	10 mA	8 mA	8 mA	8 mA	10 mA	10 mA
(at 5 MHz, 5 V)	–	–	(3 mA typical at 5 V)	(3 mA typical at 5 V)	(at 15 MHz, 5 V)	–
Max. Sleep Mode Current	100 µA	100 µA	100 µA	100 µA	100 µA	100 µA
(typical)	(30 µA)	(40 µA)	(50 µA)	(50 µA)	(30 µA)	(30 µA)
Ambient Temperature	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°
Write/Erase Time (at 5 MHz)	3.6 ms/1.8 ms	3.6 ms/1.8 ms	3.6 ms/1.8 ms	3.6 ms/1.8 ms	3.6 ms/1.8 ms	3.6 ms/1.8 ms
EEPROM Page Programming	1...64 Byte	1...8 Byte	1...8 Byte	1...32 Byte	1...64 Byte	1...64 Byte
MMU	No	No	No	No	No	No
Security Features	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,
	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms
	(e.g. DES)	(e.g. DES)	(e.g. DES)	(e.g. DES)	(e.g. DES)	(e.g. DES)
	–	–	–	–	–	–
	–	–	–	–	–	–
Peripherals	CRC	CRC	–	–	16 bit Timer	16 bit Timer
	–	–	–	–	CRC, RNG,	CRC, RNG,
	–	–	–	–	Interrupt	Interrupt
	–	–	–	–	–	–
Package	Module M5	Module M2	Module M5	Module M5	Module M5	Module M5
	Die	Die	Die	Die	Die	Die
Applications	GSM	Loyalty	Electronic purse	Multifunctional Card	Multifunctional card	Multifunctional card
	Healthcare	Gambling	Banking	GSM	Banking	Banking
	–	Membership card	Healthcare	Banking	–	–
	–	Prepaid card	Loyalty	–	–	–
	–	Metering	–	–	–	–
Certifications*	–	–	Visa level 2	Visa level 2	Visa level 3	Visa level 3
	–	–	–	–	Proton World	–
	–	–	–	–	–	–

* Valid at time of printing. May be subject of change without further notice.

Controllers

(Chip Management System) whereas the 66- and 66P families offer a RMS (Resource Management System).

The following pages show tables with standard controllers, crypto controllers and contactless controllers.

In addition you will find an overview of all controllers in categories of EEPROM sizes.

SLE 66C42P	SLE 66C82P	SLE 66C162P	SLE 66C164P	SLE 66C322P/PU	SLE 66C640P/PU	SLE 66C644P
Security Controller	Security Controller	Security Controller	Security Controller	Security Controller	Security Controller	Security Controller
62 kByte	60 kByte	70 kByte	62 kByte	134 kByte	134 kByte	196 kByte
4 kByte	8 kByte	16 kByte	16 kByte	32 kByte	64 kByte	64 kByte
2048 Byte	2048 Byte	2304 Byte	2304 Byte	4352 Byte	4352 Byte	4352 Byte
16 bit	16 bit	16 bit	16 bit	16 bit	16 bit	16 bit
–	–	–	–	–	–	–
1–7.5 MHz	1–7.5 MHz	1–7.5 MHz	1–7.5 MHz	1–7.5 MHz	1–7.5 MHz	1–15 MHz
1.62 V–5.5 V	1.62 V–5.5 V	2.7 V–5.5 V	2.7 V–5.5V	2.7 V–5.5 V	2.7 V–5.5 V	1.62V–5.5 V
10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
(at 15 MHz, 5 V)	(at 15 MHz, 5 V)	(at 15 MHz, 5 V)	(at 15 MHz, 5 V)	(at 15 MHz, 5 V)	(at 15 MHz, 5 V)	(at 15 MHz, 5 V)
200 µA	200 µA	200 µA	200 µA	200 µA	200 µA	200 µA
(100 µA)	(100 µA)	(100 µA)	(100 µA)	(100 µA)	(100 µA)	(100 µA)
-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°	-25 ... +70°
4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)
1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,	Firmware + hardware PIN,
Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms	Symmetric algorithms
(e.g. DES),	(e.g. DES),	(e.g. DES)	(e.g. DES)	(e.g. DES)	(e.g. DES)	(e.g. DES),
Triple DES,	Triple DES,	–	–	–	–	DES Accelerator
Elliptic curves	Elliptic curves	–	–	–	–	–
16 bit autoreload Timer	16 bit autoreload Timer	16 bit autoreload Timer	16 bit autoreload Timer	16 bit autoreload Timer	16 bit autoreload Timer	16 bit autoreload Timer
PLL, Interrupt, CRC,	PLL, Interrupt, CRC,	PLL, Interrupt, CRC,	PLL, Interrupt, CRC,	PLL, Interrupt, CRC,	PLL, Interrupt, CRC,	PLL, Interrupt, CRC,
RNG, UART	RNG, UART	RNG, UART	RNG, UART,	RNG, UART	RNG, UART	RNG, UART
–	–	–	Triple DES, Accelerator	–	–	–
Module M5	Module M5	Module M5	Module M5	Module M5	Module M5	Module M5
Die	Die	Die	Die	Die	Die	Die
GSM	GSM	GSM	Pay TV	GSM	Banking	Banking
Pay TV	Pay TV	Pay TV	Banking	Pay TV	Pay TV	Pay TV
Security access	Security access	Security access	Security access	Security access	Security access	Security access
Banking	Banking	Banking	GSM	Banking	GSM	GSM
Multifunctional card	Multifunctional card	Multifunctional card	Multifunctional card	Multifunctional card	Multifunctional card	Multifunctional card
–	–	Visa level 3	Visa level 3, Proton Prisma,	–	–	–
–	–	–	ITSEC/Common criteria	–	–	–
–	–	–	Multos V4/5	–	–	–

Contactless Controllers

WITH its dual interface controller SLE66CL160S, Infineon Technologies is the industry's first manufacturer world-wide to support the two contactless modulation methods for transmission in the radio frequency band, 13, 56MHz, ASK 100% and ASK 10% (Amplitude Shift Keying) in full compliance with ISO 14443.

According to the applications' security needs the customer can chose from a range of products with varying EEPROM sizes. The new Reader ICs designed in accordance with ISO14443, put Infineon Technologies into the position to offer not only smart card but also terminal ICs for an infrastructure of a well adjusted system scoring high in flexibility, performance and security.

Features	SLE 66CL80P	SLE 66CL160S
Product Description	Security dual interface controller, ASK 100% & ASK 10%, Distance 0...10 cm, Datarate 848 kbit/s, Anticollision	Security dual interface controller, ASK 100% & ASK 10%, Distance 0...10 cm, Datarate 106 kbit/s, Anticollision
User-ROM	70 kByte	31.5 kByte
EEPROM	8 kByte	16 kByte
RAM	2048 Byte	1280 Byte
CPU	16 bit	16 bit
Crypto Coprocessor	–	–
Clock (int.)	1–7.5 MHz	1–5 MHz
Operating Voltage	1.62 V–5.5 V	2.7 V–5.5 V
Max. Supply Current (at 5 MHz, 5 V)	10 mA	10 mA
Max. Sleep Mode Current (typical)	200 µA (100/50 µA)	100 µA (30 µA)
Ambient Temperature	-25 ... +70°C	-25 ... +70°C
Write/Erase Time (at 5 MHz)	4.5 ms (typ.)	3.6 ms / 1.8 ms
EEPROM Page Programming	1...64 Byte	1...64 Byte
MMU	Yes	No
Security Features	– – – – – –	Firmware + hardware Triple DES, Elliptic curves, PIN, Symmetric algorithms (e.g. DES) – – –
Peripherals	16-bit autoreload Timer CRC, RNG, UART Interrupt, PU –	16-bit Timer CRC, RNG Interrupt –
Package	Module M8 Bumped die	Module M8 Bumped die
Applications	Banking Transport Identification – –	Transport Multifunctional card Access control Banking –
Certifications*	– –	Visa level 3 ZKA

Features
Product Description
User-ROM
EEPROM
RAM
CPU
Crypto Coprocessor
Clock (int.)
Operating Voltage
Max. Supply Current (at 5 MHz, 5 V)
Max. Sleep Mode Current (typical)
Ambient Temperature
Write/Erase Time (at 5 MHz)
EEPROM Page Programming
MMU
Security Features
Peripherals
Package
Applications
Certifications*

* Valid at time of printing. May be subject of change without further notice.

Crypto Controllers

Infineon Technologies offers a range of security crypto modules in its 66 and 66P/88 families:

- 1100 bit Advanced Crypto Engine (ACE)
  The ACE is a fast arithmmetic coprocessor for fast calculation of asymmetric public key algorithms (e.g. RSA). The ACE is equipped with 700 Bytes crypto RAM.
- DES (Data Encryption Standard) Accelerator
  The DES Accelerator performs fast symmetric DES and Triple DES algorithms.
- Elliptic curves
  The elliptic curves core supports the multiplication and addition in Galois Field GF (2n), n≤191, and therefore accelerates operations for elliptiv curve cryptography.

For all our moduls we offer a wide range of software libraries to shorten development time.

	SLE 66CX160S/U	SLE 66CX160P/PU	SLE 66CX322P	SLE 66CX640P	SLE 88CX720P
	Security cryptocontroller –	Security cryptocontroller –	Security cryptocontroller –	Security cryptocontroller –	Security cryptocontroller –
	31.5 kByte	62 kByte	134 kByte	134 kByte	216 kByte
	16 kByte	16 kByte	32 kByte	64 kByte	72 kByte
	1280+700 Byte Crypto	2304+700 Byte Crypto	4352 Byte	4352 Byte Crypto	8192 Byte
	16 bit	16 bit	16 bit	16 bit	32 bit
	1100 bit arithmetic	1100 bit arithmetic	1100 bit arithmetic	1100 bit arithmetic	1100 bit arithmetic
	1–5 MHz	1–7.5 MHz	1–15 MHz	1–10 MHz	1–66 MHz
	2.7 V–5.5 V	2.7 V–5.5 V	1.62 V–5.5 V	2.7 V–5.5 V	1.62 V–5.5 V
	10 mA	10 mA (at 15 MHz, 5 V)	10 mA (at 15 MHz, 5 V)	10 mA (at 15 MHz, 5 V)	30 mA (at 66 MHz, 5 V)
	100 µA	200 µA (100 µA)	200 µA (100 µA)	200 µA (100 µA)	100 µA (100 µA)
	-25 ... +70°C	-25 ... +70°C	-25 ... +70°C	-25 ... +70°C	-25 ... +85°C
	3.6 ms / 1.8 ms	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)	4.5 ms (typ.)
	1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte	1...64 Byte
	No	Yes	Yes	Yes	Yes
	Firmware + hardware PIN, Symmetric algorithms (e.g. DES), Asymmetric algorithms, Hardware supported (e.g. RSA)	Firmware + hardware Triple DES, Elliptic curves, PIN, Asymmetric algorithms, Hardware supported (e.g. RSA)	Firmware + hardware Triple DES, Elliptic curves, PIN, Asymmetric algorithms, Hardware supported (e.g. RSA)	Firmware + hardware Triple DES, Elliptic curves, PIN, Asymmetric algorithms, Hardware supported (e.g. RSA)	Firmware + hardware Triple DES, Elliptic curves, PIN, Asymmetric algorithms, Hardware supported (e.g. RSA) Virtual memory system
	16 bit Timer, CRC, RNG, Interrupt –	16 bit autoreload Timer, PLL, Interrupt, CRC, RNG, UART, Triple DES, Accelerator	16 bit autoreload Timer, PLL, Interrupt, CRC, RNG, UART, Triple DES, Accelerator	16 bit autoreload Timer, PLL, Interrupt, CRC, RNG, UART, Triple DES, Accelerator	16 bit autoreload Timer, PLL, Interrupt, RNG, UART, Triple DES, Accelerator
	Module M5 Die	Module M5 Die	Module M5 Die	Module M5 Die	Module M5 Die
	Banking Pay TV Security access Healthcare Multifunctional card	Banking Pay TV Security access GSM Multifunctional card	Banking Pay TV Security access GSM Multifunctional card	Banking Pay TV Security access GSM Multifunctional card	Banking Pay TV Security access GSM / USM Multifunctional card
	Multos 4.x Visa level 3	Visa level 3, ZKA, Proton Prisma, ITSEC E4 high, Multos V4/5	Common criteria, Visa level 3, ZKA, Proton Prisma	– –	– –

Packages

IN THE preassembly stage we provide thinning and sawing of 5", 6" and 8" wafers as well as pad metallization.

Our packaging operations guarantee high-quality and high-volume packaging of all chip card ICs, MultiMediaCards™, SNM-TSOPs, FingerTIP™ sensors, and crypto ICs in SMD packages for PCB mounting.

For contactless ICs we offer bumped wafers. In addition to our complete assembly capabilities, we offer a comprehensive range of customer services.

For your high-quality job order assembly we provide our vast experience and high-volume capacities.

Last but not least, our customers can profit from our support and consulting services with regard to chip card module implantation, dimension and tolerances, qualification and reliability, delivery as well as new products.

M2.2
SLE 4418/28, SLE 4466
Pitch: 14.25mm
Dimension: 13 × 11.8 [mm]
Globe Top: max. ø 8.9 mm
Thickness: max. 0.58 mm

M3.2
SLE 4432/42, SLE 4436, 5536, 5536S, SLE 4406S/SE, Eurochip
Pitch: 9.5 mm
Dimension: 11 × 8.3 [mm]
Globe Top: max. 7.7 × 7 [mm]
Thickness: max. 0.58 mm

M4.2
Chip on Chip
Pitch: 14.25 mm
Dimension: 13 × 11.8 [mm]
Globe Top: with Frame 9.5 × 10 [mm]
Thickness: max. 0.62 mm

M5.1
SLE 44C80S/U, SLE 66C42P, SLE 66C82P, SLE 66C162P, SLE 66C164P, SLE 66C320PU, SLE 66C322P, SLE 11C001U, SLE 66CX160P, SLE 66CX322P
Pitch: 14.25 mm
Dimension: 13 × 11.8 [mm]
Globe Top: without Frame 9.3 × 9.8 [mm]
Thickness: max. 0.58 mm

M5.2
SLE 66C160U, SLE 66CX160S/U, SLE 66C320S/U, SLE 66C640P, SLE 66CX640P, SLE 88CX720P
Pitch: 14.25 mm
Dimension: 13 × 11.8 [mm]
Globe Top: without Frame 9.3 × 9.8 [mm]
Thickness: max. 0.58 mm

M5.x replaces M4.3, M4.4/M6.3

M8.4
SLE 66CL160S/U
Dual Interface
Pitch: 14.25 mm
Dimension of Module: 13 × 11.8 [mm]
Globe Top: without Frame
8.2 × 8.2 [mm]
Thickness of Module: max. 0.58 mm

MCC2-2-1
SLE 55R01/02/04/08/16, SLE 44R35S
Pitch: 4.75 mm
Dimension: 2.93 × 10.3 [mm]
Thickness: max. 0.33 mm

Secure Terminal ICs

INFINEON'S SECURE terminal components complete the company's broad chip card IC portfolio and support common chip card standards. The terminal architecture is designed as an open platform, based on proven technologies, which enables compatibility on all security levels.

Therefore the portfolio provides the logic part for the contactless Interface as well as Secure Access Modules (SLF9610/SLF9611). The SLF9000N is responsible for fully ISO 14443 Type A (Amplitude Shift Keying 100%) and Type B (ASK 10%) compatible Communication and offers anti-collision methods.

Suitable for contactless and contact-based terminals, the SLF9610/SLF9611 enables high secure authentication between the terminal and the chip card and handles cards communication with the background system.

SLF9000N

Characteristics:

- Communication: Type A and Type B Type A with Slotted Aloha
- Data transfer rate: 106 kbit/s
- Operating frequency: 13.56 MHz
- Security: Transparent for all data
- Interfaces: MPU-Interface for µC connection and EPP-Interface for PC-connection
- Operating distance: up to 12 cm (depending on analog part)
- Package: 44-pin Plastic Leaded Chip Carrier (PLCC).

Advantages:

- Type A = ASK 100% and Type B = ASK 10% on one chip.
- Support of all ISO 14443 standardized Controller ICs and Memory ICs
- Highest flexibility for security realization
- Adaptability of ISO protocols due to programmable registers
- Best price / performance ratio

SLF9610/SLF9611

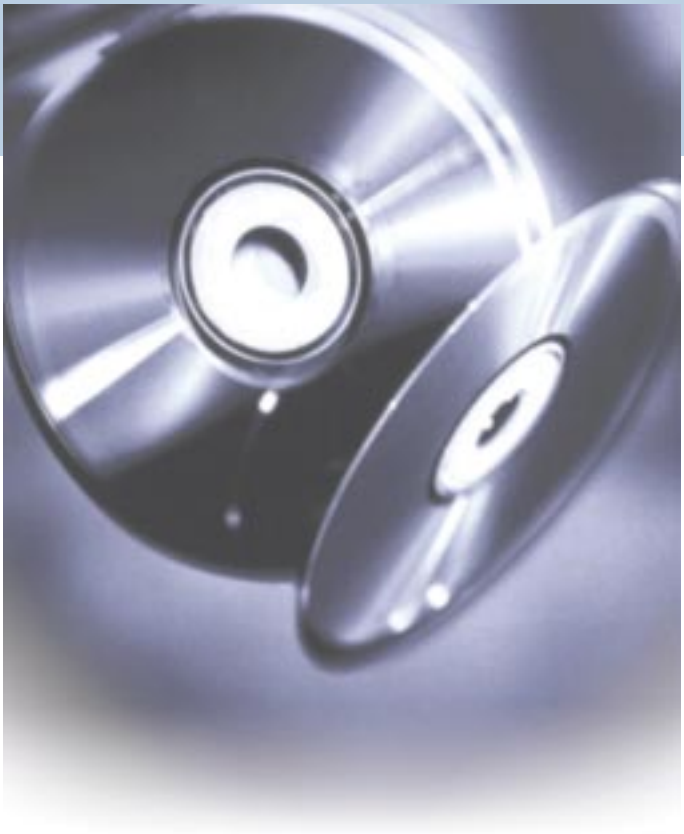
Characteristics:

- Off-line processing of all types of user cards
- On-line functionality (for SLF9611) download of keys, parameters, Firmware and upload of counter values
- Communication according to ISO 7816
- Strong 64 bit cryptographic algorithm of 55-contactless Memory IC
- Triple-DES in hardware
- 16-bit microcontroller in CMOS technology
- CMOS-Security technology

Advantages:

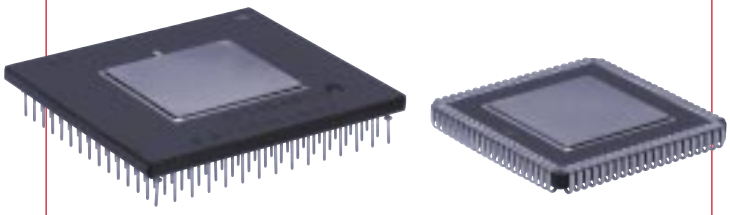
- Proven standardized security system
- Highest security
- Highest flexibility
- "Plug-in-ID-card" form factor
- Possibility of online system update

Tools



INFINEON TECHNOLOGIES supplies a broad range of sophisticated tools to support all aspects of your chip application development. This offer includes software tools for programming of peripherals as well as for coding of applications.

In addition, we deliver comprehensive worldwide customer support when it comes to the deployment of new technologies.



Bondouts

The bondout chips from Infineon Technologies are especially designed for the chip card controller series. This allows the user to emulate their software in real time mode with a chip which is as close as possible to the final product chip.

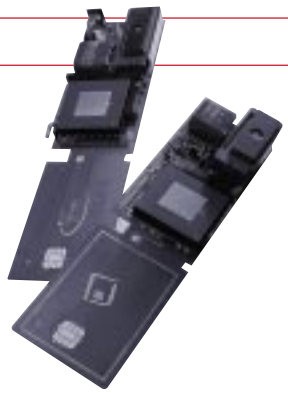
Emulator Hitex

The well known AX class Hitex In Circuit Emulator was adapted for SLE 44CxxS, SLE 66CxxS and SLE 66CxxxP.

This offers highly efficient test capabilities for software development.

Emulator KSC

The KSC Emulators are powerful In Circuit emulators adapted for the chip card controllers series SLE 44CxxS, SLE 66CxxS and SLE 66CxxxP. The emulation is based on bondout chips that guarantee an efficient software development.



Card Emulators

The Card Emulators allow software verification in a system environment prior to ROM-mask production. This is the perfect tool for software release by customers and end users.

Tools

ROM Monitor

The ROM Monitor is an efficient debugger for software development for the Infineon Technologies SLE 66CxxS and SLE 66CxxxP chip card controller families with an attractive price/performance ratio.

Contactless Reader EVA Kit

The Infineon Contactless Reader EVA Kit is the ideal test platform for all Proximity Chipcard devices according to ISO 14443 such as the Infineon 55Rxx secure memory IC family or the secure Controller IC SLE 66CL 160S. The Infineon Contactless Reader EVA Kit design is built around the Terminal IC and "Proximity UART device" SLF9000 from Infineon and therefore also represents a Contactless Reader reference implementation.

Infineon Technologies Evaluation Kits

The EVA Reader is designed for Security Memory ICs. Dedicated window oriented user interfaces allow easy access to the Security Memory ICs respectively.

Software Development Kit for Chip Card

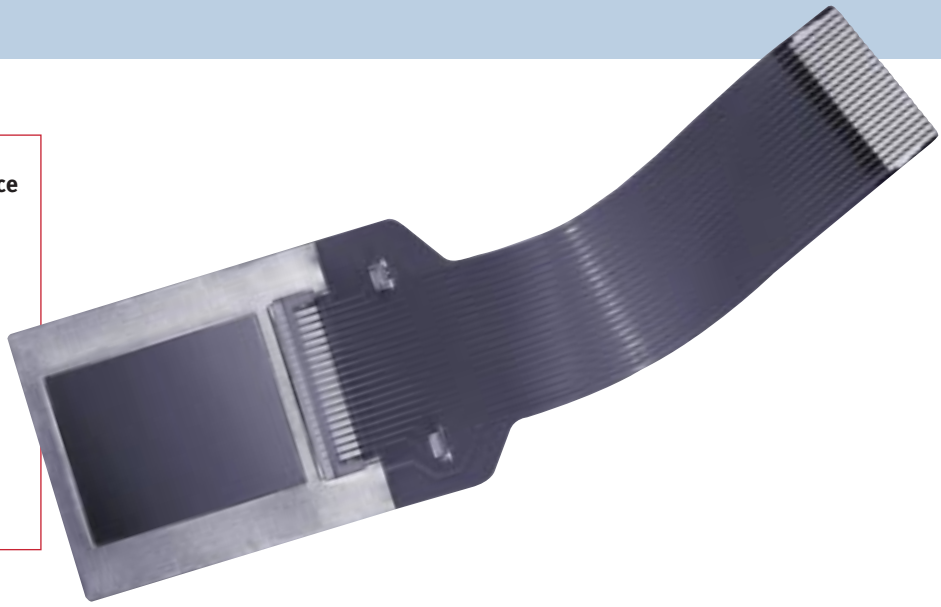
The Infineon Technologies Development Kit for chip card controller ICs is based on the well known Keil PK51. The Windows based Integrated Development Environment includes Assembler, Compiler, and Simulator Drivers for SLE 44CxxS, SLE 66CxxS and SLE 66CxxxP.

Smart Mask Package

Smart Mask Package is a soft-masking tool for testing of developed operating systems/applications on the product chips for the SLE 66CxxS and SLE 66CxxxP chip card controller families. User-defined applications can be programmed into the EEPROM and can be executed. The package is delivered with a chip card reader and a sample card which are protected on delivery by a customer-specific security key. The generic terminal programm CCTop™ covers the full SmartMask™ soft masking functionality as secure downloading.

FingerTIP™

SECURITY is of vital importance for all applications in today's information and communication technology.
Infineon Technologies now introduces FingerTIP, a new single-chip solution based on the biometric method of fingerprint recognition.



THE Security & ChipCard ICs division has a long-standing track record in proving innovative power for instance by introducing FingerTIP. This is a highly sophisticated, single-chip solution based on the biometric method of fingerprint recognition for the positive identification of authorized users.

When convenience and security is of vital importance to you, FingerTIP will meet all your application requirements, giving you ultimate peace of mind.

Evaluation kit
The biometric system FingerTIP consists of the sensor in a package form including a flexible PCB and optionally biometric algorithms.
The devices are delivered as modules in package form with or without software algorithms.

Characteristics

- Data transfer time < 100 ms
- Resolution 224 × 288 pixel, 513 dpi, data format 8 bit/pixel
- Sensor area: 11.1 × 14.3 mm
- Module: 18 mm × 21 mm × 1.5 mm, length of the flexible PCB 45 mm
- Interface parallel (EEP 1.9 protocol) and additionally serial (SPI) on-chip, selectable
- USB via 2-chip solution possible
- VCC operating range 3.3 V ... 5.5 V
- Power consumption < 50 mW; sleepmode < 5 mW
- Operational temperature –40 °C ... +85 °C
- Chemical resistance protection against liquids, gases and sweat
- Mechanical resistance to prevent "rub-off" and scratching over the sensor surface
- ESD proof up to **15 kV**

FingerTIP v3.1
NEW: 15 kV
NEW: SMD-Package
NEW: improved surface

System solutions through Silicon Trust Partners

SILICONTRUST™

www.silicon-trust.com

Trusted Platform Module – SLD 9630 F 1.0

COMMUNICATION over the Internet is growing continuously. Many applications, such as those intended for eCommerce, are based on trust in the communication partner and the reliability of the connection. You have to provide authenticity, integrity, confidentiality/privacy.

With the development of TCPA (Trusted Computing Platform Alliance), a powerful business initiative was launched. Its objective? To increase confidence in the Internet. The TCPA founded by Compaq, Hewlett-Packard, IBM, Intel and Microsoft (now including more than 160 companies), has defined a device – known as the Trusted Platform Module (TPM) – which will assume responsibility for many important security functions.

TPM is the root-of-trust in a given platform (e.g. a PC, notebook, and in the future, a mobile phone or PDA). It checks the system integrity – and authenticates third-party users who would like to access the platform – while remaining under complete control of its primary user. Thus, privacy and confidentiality are assured. With TPM-based platforms it will be possible for the first time to create the basis for a world-wide public key infrastructure (PKI). This in turn will ensure the security of many applications for private and corporate environments in particular – while making other types of applications possible for the first time.

Characteristics Hardware:

- 64 kByte ROM; 8 kByte RAM
- 16 kByte EEPROM with 500,000 write/erase cycles
- HW-RSA-Accelerator (Signature Calculation, Signature Verification and Key Generation @ 2048 bit key – using CRT)
- Hardware Hash-Accelerator (SHA-1, MD-5)
- True Random Number Generator
- The highest possible security levels against SPA and DPA
- Low power consumption
- 2 timers and 1 interrupt module
- Easy integration into virtually every known PC platform, the TPM uses the standardized LPC interface (Low Pincount Interface) – as defined by Intel

Characteristics Software:

- Embedded secure operating system
- Embedded application
- Reference implementation for PC-BIOS integration
- TSS software stack according to TCPA specification
- TPM Cryptographic service provider (CSP)

MultiMediaCard™ from Ingentix[1)]

Great potential for much more

Preliminary Technical Data

Technology	Flash*
Operating voltage range	2.7 ... 3.6 V
Power consumption	‹ 20 mW @ 20 MHz, ‹ 0.1 mW standby
Serial transport data rate	up to 20 Mbit/s
Access time	‹ 10 µs
ESD protection	+/- 4 kV
Card sizes	32×24×1.4 mm
Ambient operating temperature	–25... +85°C
Ambient storage temperature	–40... +85°C
Number of pads	7
Service life	10,000 mate/unmate operations
Memory capacity	16/32/64 MByte
Memory access	linear memory address space, Byte accessible
Interface	serial synchronous high speed interface
Operating modes	card identification mode data transfer mode
Clock frequency	0–400 kHz in card identification mode, 0–20 MHz in data transfer mode
Stackability	up to 30 cards

* Datasheets, please see our web page: http://www.infineon.com/multimediacard

Special characteristic – extremely fast

A characteristic of MultiMediaCard is the high data transmission rate of up to 20 Mbit/s. Another decisive performance feature is its short access time of less than 10 µs. With its technology, the new MultiMediaCard is thus a storage medium which has no need to fear any competition in multimedia applications. The data are organized Byte by Byte and can, of course, be freely addressed.

Power consumption – a powerful bonus

Power consumption is still a critical variable for many applications. This is not the case with MultiMediaCard. Approx. 20 mWs is needed for reading out the whole MultiMediaCard in the playback unit and is thus an indication of its almost unbeatable superiority. This can be taken advantage of, especially in mobile applications.

Potential for development – promising for the future

Thanks to its space-saving cell design the current generation MultiMediaCard chip already has a memory capacity of up to 64 MByte. The 128 MByte version will follow and further improve the already favorable price/performance ratio. In order to increase memory capacity, it is also conceivable that several chips could be integrated on MultiMediaCard.

Data throughput can be improved as well by providing additional data lines. MultiMediaCard also possesses all the requirements for using new and interesting applications as a result of the intelligent interface and rewritable memory.

1) Ingentix is a joint venture between Infineon Technologies AG and Saifun Semiconductor Ltd.

Glossary

ACE

Advanced Crypto Engine

ASK

Amplituden Shift Keying

ATM

Automated teller machine

Authentication

Advanced security feature using a challenge and response procedure

Cipher block Chaining

Special type of symmetric algorithm

CMS

Chip Management System

- 2 kByte of mask programmable ROM
- interface and EEPROM access routines

CPU

Central Processing Unit

- 8 or 16 bit Infineon Technologies proprietary controller architecture
- 8051 opcode compatible
- security optimized
- performance optimized

Crypto-Coprocessor

Arithmetic unit for execution of asymmetric algorithms, e.g. full 512 bit exponentation without chinese remainder in less than 220 ms (at 5 MHz)

CRC

Cyclic Redundancy Check

DES

Data Encryption Standard

- symmetric algorithm

ESD

Electro Static Discharge

EEPROM

Electrically Erasable Programmable Read-Only Memory

GSM

Global System for Mobile communication

ISO

International Standardization Organization

MMU

Memory Management Unit

Module

Packaging for easy embedding of ICs into cards

MPU

Microprocessor Unit

PCB

Printed Circuit Board

PIN

Personal Identification Number

POS

Point Of Sales

PROM

Programmable Read-Only Memory

RAM

Random Access Memory

RMS

Resource Management System

RNG

Random Number Generator

ROM

Read-Only Memory

RSA

Rivest, Shamir, Adleman

- asymmetric algorithm

SMD

Surface mounted device

UART

Universal Asynchronous Receiver Transmitter

INFINEON TECHNOLOGIES – FIND US AT AN OFFICE NEAR YOU

A
Infineon Technologies Villach AG
Vertrieb
Operngasse 20B/3/31
1040 Wien
☎ (+43) 1-5 87-70 70 0
Fax (+43) 1-5 87-70 70 20 0

AUS
Siemens Ltd.
885 Mountain Highway
Bayswater, Victoria 3153
☎ (+61) 3-97 21 21 11
Fax (+61) 3-97 21 72 75

BR
Infineon Technologies
South America Ltda.
Semiconductores
Avenida Eduardo Roberto Daher 1135,
Centro
06850-970 Itapeceria da Serra-SP
☎ (+55) 11-79 48-74 77
Fax (+55) 11-79 48-74 88

CDN
Infineon Technologies Corporation
320 March Road, Suite 604
Kanata, Ontario K2K 2E2
☎ (+1) 6 13-5 91 63 86
Fax (+1) 6 13-5 91 63 89

CH
Infineon Technologies AG
Siemens Schweiz AG
Freilagerstrasse 40
8047 Zürich
☎ (+41) 1-4 95 44 11
Fax (+41) 1-4 95 54 63

D
Infineon Technologies AG
Völklinger Str. 2
40219 Düsseldorf
☎ (+49) 2 11-3 99 29 30
Fax (+49) 2 11-3 99 14 81

Infineon Technologies AG
Werner-von-Siemens-Platz 1
30880 Laatzen (Hannover)
☎ (+49) 5 11-8 77 22 22
Fax (+49) 5 11-8 77 15 20

Infineon Technologies AG
Von-der-Tann-Straße 30
90439 Nürnberg
☎ (+49) 9 11-6 54 76 99
Fax (+49) 9 11-6 54 76 24

Infineon Technologies AG
Weissacher Straße 11
70499 Stuttgart
☎ (+49) 7 11-1 37 33 14
Fax (+49) 7 11-1 37 24 48

Infineon Technologies AG
Halbleiter Distribution
Richard-Strauss-Straße 76
81679 München
☎ (+49) 89-92 21 40 86
Fax (+49) 89-92 21 20 71

DK
Infineon Technologies Nordic AS
Borupvang 3
2750 Ballerup
☎ (+45) 44 77-47 48
Fax (+45) 44 77-40 48

E
Siemens S.A.
Dpto. Componentes
Ronda de Europa, 5
28760 Tres Cantos-Madrid
☎ (+34) 91-5 14 71 51
Fax (+34) 91-5 14 70 13

F
Infineon Technologies France,
39/47, Bd. Ornano
93527 Saint-Denis CEDEX 2
☎ (+33) 1-49 22 31 00
Fax (+33) 1-49 22 28 01

FIN
Infineon Technologies Nordic OY
P.O.Box 60
02601 Espoo (Helsinki)
☎ (+3 58) 10-5 11 51 51
Fax (+3 58) 10-5 11 24 95

H
Simacomp Kft.
Sajka u.4.
1023 Budapest
☎ (+36) 1-3 46 70 40
Fax (+36) 1-3 46 70 50
Email: simacomp@simacomp.hu

HK
Infineon Technologies
Hong Kong Ltd.
Suite 302, Level 3,
Festival Walk,
80 Tat Chee Avenue,
Yam Yat Tsuen,
Kowloon Tong
Hong Kong
☎ (+8 52) 28 32 05 00
Fax (+8 52) 28 27 97 62

I
Infineon Technologies Italia
Via Vipiteno 4
20127 Milano
☎ (+39) 02-66 76-1
Fax (+39) 02-66 76 43 95

IND
Siemens Ltd.
Components Division
No. 84 Keonics Electronic City
Hosur Road
Bangalore 561 229
☎ (+91) 80-8 52 11 22
Fax (+91) 80-8 52 11 80

Siemens Ltd.
CMP Div, 5th Floor
4A Ring Road, IP Estate
New Delhi 110 002
☎ (+91) 11-3 31 99 12
Fax (+91) 11-3 31 96 04

Siemens Ltd.
CMP Div, 4th Floor
130, Pandurang Budhkar Marg,
Worli
Mumbai 400 018
☎ (+91) 22-4 96 21 99
Fax (+91) 22-4 96 22 01

IRL
Siemens Ltd.
Electronic Components Division
8, Raglan Road
Dublin 4
☎ (+3 53) 1-2 16 23 42
Fax (+3 53) 1-2 16 23 49

IL
Nisko Ltd.
2A, Habarzel St.
P. O. Box 58151
61580 Tel Aviv – Israel
☎ (+9 72) 3-7 65 73 00
Fax (+9 72) 3-7 65 73 33

J
Infineon Technologies Japan K.K.
Takanawa Park Tower 9F
3-20-14, Higashi-Gotanda,
Shinagawa-ku,
141-0022, Tokyo
☎ (+81) 3-54 49 67 37
Fax (+81) 3-54 49 67 38

MAL
Infineon Technologies AG
Sdn Bhd
Bayan Lepas Free Industrial Zone 1
11900 Penang
☎ (+60) 4-6 44 99 75
Fax (+60) 4-6 41 48 72

N
Siemens Components
Scandinavia
Østre Aker vei 24
Postboks 10, Veitvet
0518 Oslo
☎ (+47) 22-63 30 00
Fax (+47) 22-68 49 13
Email: scs@components.siemens.se

NL
Infineon Technologies Holding B.V.
Sales Division Benelux
Westblaak 32
3012 KM Rotterdam
☎ (+31) 10-2 17 68 00
Fax (+31) 10-2 17 68 19
Email: benelux_info@infineon.com

NZ
Siemens Components
300 Great South Road
Greenland
Auckland
☎ (+64) 9-5 20 30 33
Fax (+64) 9-5 20 15 56

P
Siemens S.A.
an Componentes Electronicos
R. Irmaos Siemens, 1
Alfragide
2720-093 Amadora
☎ (+351) 1-4 17 85 90
Fax (+351) 1-4 17 80 83

PK
Siemens Pakistan Engineering
Co. Ltd.
PO Box 1129, Islamabad 44000
23 West Jinnah Ave
Islamabad
☎ (+92) 51-21 22 00
Fax (+92) 51-21 16 10

PL
Siemens SP. z.o.o.
ul. Zupnicza 11
03-821 Warszawa
☎ (+48) 22-8 70 91 50
Fax (+48) 22-8 70 91 59

PRC
Infineon Technologies
Hong Kong Ltd.
Beijing Office
Room 2106, Building A
Vantone New World Plaza
No. 2 Fu Cheng Men Wai Da Jie
100037 Beijing
☎ (+86) 10-68 57 90-06, -07
Fax (+86) 10-68 57 90 08

Infineon Technologies
Hong Kong Ltd.
Chengdu Office
Room 14J1, Jinyang Mansion
58 Tidu Street
Chengdu,
Sichuan Province 610 016
☎ (+86) 28-6 61 54 46 / 79 51
Fax (+86) 28-6 61 01 59

Infineon Technologies
Hong Kong Ltd.
Shanghai Office
Room 1101, Lucky Target Square
No. 500 Chengdu Road North
Shanghai 200003
☎ (+86) 21-63 61 26 18 / 19
Fax (+86) 21-63 61 11 67

Infineon Technologies
Hong Kong Ltd.
Shenzhen Office
Room 1502, Block A
Tian An International Building
Renim South Road
Shenzhen 518 005
☎ (+86) 7 55-2 28 91 04
Fax (+86) 7 55-2 28 02 17

RC
Infineon Technologies
Asia Pacific Pte. Ltd.
Taiwan Branch
10F, No. 136 Nan King East Road
Section 23, Taipei
☎ (+8 86) 2-27 73 66 06
Fax (+8 86) 2-27 71 20 76

ROK
Siemens Ltd.
Asia Tower, 10th Floor
726 Yeoksam-dong, Kang-nam Ku
CPO Box 3001
Seoul 135-080
☎ (+82) 2-5 27 77 00
Fax (+82) 2-5 27 77 79

RSA
Siemens Ltd. Components Division
P.O. Box 3438
Halfway House 1685
Gauteng
South Africa
☎ (+27) 11-6 52-26 89
Fax (+27) 11-6 52-25 73
Email: solutions@siemens.co.za

RUS
INTECH electronics
ul. Smolnaya, 24a/1203
125 445 Moscow
☎ (+7) 0 95-4 51 97 37
Fax (+7) 0 95-4 51 86 08
Email: ml-intec@aha.ru

S
Infineon Technologies Nordic AB
Box 46
164 93 Kista
☎ (+46) 8-7 03 59 00
Fax (+46) 8-7 03 59 01

SGP
Infineon Technologies Asia
Pacific, Pte. Ltd.
168 Kallang Way
Singapore 349 253
☎ (+65) 8 40 08 88
Fax (+65) 8 40 02 91

UK
Infineon Technologies UK Ltd.
Infineon House
Fleet Mill
Minley Road
Fleet, Hampshire GU51 2RD
☎ (+44) 12 52-77 22 00
Fax (+44) 12 52-77 22 01

USA
Infineon Technologies Corporation
1730 North First Street
San Jose, CA 95112
☎ (+1) 4 08-5 01 60 00
Fax (+1) 4 08-5 01 24 24

Infineon Technologies
North American Corp.
Optoelectronics Division
3870 North First Street
San Jose, CA 95134
☎ (+1) 4 08-4 56 40 00
Fax (+1) 4 08-4 56 43 06

Infineon Technologies web sites:
http://www.infineon.com

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