

## **Hitachi Releases Smart Card Microcontroller “AE45X series” Equipped with Contact/Contactless Dual Interface in a Single Chip**

— Suitable for multi-purpose multi-application smart cards in the fields such as finance with advanced security in contact type and high-speed communication in contactless type —

Tokyo, April 22, 2002 — Hitachi, Ltd. (TSE: 6501) today announced a smart card microcontroller "AE45X series" that is equipped with contact and contactless dual interface in a single chip. The microcontroller is also equipped with large capacity memory that enables multi-applications. As the first product, "AE45X-B" is developed and sample shipments will begin in July 2002 in Japan.

This product is equipped with built-in 16-bit CPU core "AE-4" that was developed for smart cards and a high security function that prevents illegal read operation etc.. As the external interface, this product incorporates the contact type interface complying with "ISO/IEC 7816\*<sup>1</sup>" and the contactless type interface complying with "ISO/IEC 14443 Type-B\*<sup>2</sup>". "AE45X-B" is suitable for multi-purpose smart cards, including those in a financial field with its firm security function and contact/contactless interfaces, and enabling reduce the cost of smart card.

Recently, smart cards equipped with a microcontroller are used in many fields including GSM-SIM\*<sup>3</sup> and W-CDMA-UIM\*<sup>4</sup> cards in mobile phones, credit cards and cash cards in the financial field and electronic tickets and ETC\*<sup>5</sup> cards in the transportation field. Previously, single function cards each of which achieve a single function only have been the main stream. However, since smart cards are now used in many fields, development of multi-application cards that each achieve multiple functions is progressing. Moreover popularity of non-contact type is increasing in the distribution fields that require high-speed communication such as the transportation field and pursue convenience such as the distribution field, as opposed to the existing contact type cards. For multi-application cards that are shared by multiple fields, a dual mode that can handle both a contact type and a contactless type has become necessary.

In the general method, two chips are incorporated in one card to achieve a dual mode, one IC chip for a contact interface and one IC chip for a contactless interface. However, this method has problems such as the necessity for sharing of data between each IC chips, increasing development cost, and no possibility for reduction of card prices. Therefore, a device that can actualize a dual mode in a single chip and handle multi-applications has come into strong demand.

To respond to the demand, Hitachi developed "AE45X series" that is equipped with built-in 16-bit CPU core "AE-4" for smart card microcontroller and also contact and contactless interfaces in a single chip. As the first product, Hitachi releases "AE45X-B" and its features are as follows.

## [Product features]

- (1) Smart Card Microcontroller Equipped with Contact/Contactless Dual Interface in a Single Chip  
The microcontroller incorporates a contact interface complying with "ISO/IEC 7816" and a contactless interface complying with "ISO/IEC 14443 Type-B" that is planned to be used in the public field.. Achievement of dual interface of contact/contactless interfaces in a single chip enables reduction of development cost and reduction of smart card prices.
- (2) Handling multi-applications with the built-in large capacity memory  
The microcontrollers incorporate large capacity memory of 36K bytes EEPROM and 128K bytes Mask ROM. This enables the store of multiple application programs that achieve each function through a contact interface or a contactless interface, enabling introduction of smart cards to multi-applications. The controllers can store general OSs such as MULTOS™<sup>6</sup> and Java Card™<sup>7</sup>, which are expected to be more widely used in the future.
- (3) Achieving strong data protection being equipped with a high security function  
As the security function, the microcontroller incorporates a "exponential multiplication/division algorithm" coprocessor for PKI<sup>8</sup> which is the base technology of security data communication and a coprocessor for DES encryption of Symmetric Key Encryption. With using these coprocessors, high-speed encryption processing is achieved and to handle high-level encryption is enabled. To handle fields requiring high security such as financial cards, strong data protection security with advanced functions is achieved through various detectors (detection functions), a protection function, and shield of chip circuits.

As the development environment, the emulator that includes the functions of supporting for "AE45X series" in addition to conventional "E6000 emulator" can be used. Since the software of the microcontrollers are compatible with the conventional microcontrollers "AE-4 Series", existing software resources such as OS and application programs can be used. As the shipment forms, "wafer" and "COT (Chip On Tape)" are available.

Hitachi will develop the smart card controller incorporating other contact/contactless interfaces. Also Hitachi continue the enhancement of the product lineup of the "AE Series" and development of products handling a wide range of application fields.

- Notes: 1. ISO/IEC 7816:  
Contact type smart card standard regulating physical characteristics of the card, pin positions and the size, electrical signal protocol, and common commands
2. ISO/IEC 14443 Type-B:  
Contactless type smart card (adjacent type) standard regulating physical characteristics of the card, power and signal interfaces of radio frequencies, collision prevention processing, and transmission protocol
  3. GSM-SIM: (Global System for Mobile communication - Subscribe Identity Module)  
GSM is a methodology for mobile communication such as for mobile phones. A SIM card stores user information and by incorporating a card in a GSM telephone set, calls can be made using the information of the card owner.
  4. W-CDMA-UIM: (Wide band-Code Division Multiple Access - User Identify Module)  
W-CDMA is one of the communication methodologies that are used for next-generation mobile phones. The methodology targets enhancement of voice quality, high-speed data communication, and international roaming, in comparison to the conventional methods such as GSM and PDC. A UIM card stores user information in the same way as the SIM card that is used for GSM.
  5. ETC:  
Electronic Toll Collection system. This is a non-stop automatic toll collection system and collects tolls automatically when vehicles pass toll stations of toll roads through a radio device on the road side and on-vehicle device installed in a vehicle.
  6. MULTOS:  
Multi Application OS. MULTOS is a registered trademark of Mondex International Limited of UK.
  7. Java and Java-related trademarks and logos are trademarks of Sun Microsystems, Inc. of USA.

8. PKI: Public Key Infrastructure. This is an environment that enables safe communication using encryption technology called Public Key Cryptographic Scheme and an electronic signature, and is one of the important technologies.

**< Typical Applications >**

- Various smart cards  
Multi-application cards, financial integration card, distribution integration card, electronic ticket integration card, and cards in the public field such as resident basic register cards, credit card, electronic money card, bank cash card, employee identification, identification card, network card, and point card
- Security chips for workstations and personal computers, and so on

**< Prices in Japan >(For Reference)**

<b>Product Code</b>	<b>Shipment Form</b>	<b>Sample Price (yen/unit)</b>	
AE45X-B	HWD65145XBT	Wafer (unsawn)	700
	HWD65145XBTD	Wafer (sawn)	730
	HD65145XBDB	COT	800

**< Specifications >**

<b>Model Name</b>		<b>AE45X-B</b>
Product Code		HWD65145XBT HWD65145XBTD HD65145XBDB
CPU Core		AE-4
Memory	EEPROM (bytes)	36 K
	ROM (bytes)	128 K
	RAM (bytes)	4 K
Coprocessor		- "exponential multiplication/division algorithm" coprocessor - coprocessor for DES encryption
Security function		Detectors of abnormal status such as voltage, frequency and so on, watch-dog timer, random-number generator
Interface	Contact	ISO/IEC 7816
	Contactless	ISO/IEC 14443 Type-B
Operation frequency/operation voltage (At contact operation)		1 MHz to 10 MHz / 5 V 1 MHz to 5 MHz / 3 V
Shipment form		Wafer, COT

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Information contained in this news release is current as of the date of the press announcement, but may be subject to change without prior notice.

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