Hitachi Releases AE46C1 Smart Card Microcontroller with Large Memory Capacity and Low Power Consumption

⎯⎯ Using 0.18µm CMOS process, achievement of large memory capacity and supporting for multi–application smart cards uses. ⎯⎯

Tokyo, January 27, 2003⎯ Hitachi, Ltd. (TSE: 6501) today announced the AE46C1, a 16-bit smart card microcontroller manufactured using 0.18µm CMOS process that makes possible a large memory capacity and reduces power consumption to about one-half that of Hitachi previous model. It is designed for use in smart cards requiring increased functionality and memory capacity, such as W-CDMA-USIM*[1] cards for mobile phones and multi-application cards. Sample shipments will begin in April 2003 in Japan.

In recent years smart cards incorporating microcontroller chips have been proliferating rapidly, especially as GSM-SIM*[2] cards for mobile phones in Europe. They have also come to be used for a wide range of other applications, such as credit cards, bank debit cards, ETC*[3] cards, electronic passenger tickets, and ID cards. In addition, demand for multi-application cards, which implement several functions on a single smart card, has been growing recently. It is anticipated that this will result in increased utilization of general OSs enabling to execute multiple applications, such as Java Card™*[4] and MULTOS™*[5], and also an increase in the size of the application programs stored on cards. As a result, requirements for smart card microcontrollers now include fast processing on general OSs and large memory capacity to be able to store these operating systems and their application programs. In addition, there is a need for reduced power consumption for use with mobile phones as well as advanced security functions to prevent card forgery and data tampering.

Hitachi has responded to this demand with the 8-bit AE-3 Series and the 16-bit AE-4 Series products. The new AE46C1 is a 16-bit smart card microcontroller and is based on the existing top model AE46C. It is suitable for the smart cards that require the higher-performance and higher-functionality, such as W-CDMA-USIM cards for third-generation mobile phones and multi-application cards. The AE46C1 employs 0.18µ m CMOS process and it incorporates Hitachi's high-reliability memory technology and security technology, and its main features are as follows.

< Features >

1. Using fine process, achievement of highly reliable EEPROM and large memory capacity

    The AE46C1 incorporates 68 kilobytes of highly reliable MONOS (Metal Oxide Nitride Oxide Silicon) type EEPROM. With finer process, a rewrite speed (erase and write operations) is 3

milliseconds or less per 1 to 128 bytes and is approximately 1.3 times as fast as in previous Hitachi model AE46C. In addition, a fast mode with a rewrite speed of 2 milliseconds or less per 1 to 128 bytes is provided for the initial data or basic applications, which are rewritten only infrequently. This helps to reduce costs associated with the processing required when issuing smart cards, and also contributes to shorter data processing times in smart card.

In addition to the above, the mask ROM capacity has been expanded to a 368-kilobyte. This makes it possible to store in mask ROM, in addition to the operating system, applications and data that previously would have to have been stored in EEROM. This enables the implementation of multi-application smart cards incorporating several large-scale application programs. Also, in addition to reducing the time required to write data to EEPROM when issuing a new card, the entire 68 kilobytes of EEPROM capacity can be used for other applications or data after the card is issued.

2. Low-power and low-voltage operation achieving smart cards requiring low power consumption

In addition to the use of the 0.18μm CMOS process, the operating voltage of the internal circuitry has been reduced to a mere 1.8 volts. This results in power consumption roughly one-half that of previous model at an external operating voltage of 3 volts. This low level of power consumption can help to extend the battery operating time of mobile products. The AE46C1 also supports an external operating voltage of 1.8 volts, making it possible to design smart cards that reduce power consumption even further.

3. Equipped with coprocessors and other functions to realize high -level security of smart card

The AE46C1 incorporates a coprocessor for DES (Data Encryption Standard) encryption processing and an exponential multiplication/division algorithm coprocessor. With using these coprocessors, it supports sophisticated encryption processing. Its built-in high-level security functions also include detectors of abnormal voltage and frequency to prevent the attacks. These functions make it possible to develop smart cards incorporating sophisticated security features. In addition, Hitachi plans to obtain certification of ISO 15408*[6] international security standard as an assurance of the AE46C1 security level.

As the development environment, the previously released E6000 emulator is available to use for the AE46C1. Also the existing AE-4 Series of software resources can be used.

Hitachi plans to continue to enhance the products employing the 0.18μm CMOS process in response to market requirements.

Notes: 1.   W-CDMA-USIM (Wide band-Code Division Multiple Access - Universal Subscriber Identity Module): W-CDMA is one of the communication methodologies that are used in third-generation mobile phones. A USIM card stores user information. Once the card is inserted into the phone the owner information it contains is used as the basis for placing calls.

2.   GSM-SIM (Global System for Mobile communication - Subscriber Identity Module): GSM is a wireless communication methodology used in mobile communication devices such as mobile phones. A SIM card stores user information in the same way as the USIM cards used for W-CDMA.

3.   ETC (Electronic Toll Collection system): A non-stop automatic toll collection system that records tolls automatically when vehicles pass through tollbooths by means of wireless communication between a radio device on the roadside and a device installed in the vehicle.

4.   Java and Java related trademarks or logos are trademarks of Sun Microsystems, Inc. of the United States.

5.   MULTOS (Multi-application Operating System) is a trademark of MAOSCO. MAOSCO is a consortium responsible for the creation and maintenance of the MULTOS standard, and MAOSCO Limited functions as its business office..

6. ISO 15408: International information technology security evaluation standard established by the ISO (International Organization for Standardization) in 1999. It is used to gauge the security strength, which is to say safety, of software and hardware products as well as systems.

< Product Applications >

- Smart cards of various types: W-CDMA-USIM cards, GSM-SIM cards, multi-application cards, etc.

< Prices in Japan >(For Reference)

Product Code		Shipment Form	Sample Unit Price (Yen)
AE46C1	HWD65246C1T	Wafer (unsawn)	1,040
	HWD65246C1TD	Wafer (sawn)	1,060
	HD65246C1LB	COT (Chip On Tape)	1,120

< Specifications >

Item		AE46C1 Specifications
Product Code		HWD65246C1T
		HWD65246C1TD
		HD65246C1LB
CPU Core		16-bit AE-4 core
Memory	EEPROM	68 Kbytes
	Mask ROM	368 Kbytes
	RAM	6.5 Kbytes
Coprocessors		• Exponential multiplication/division algorithm coprocessor
		• Coprocessor for DES encryption
Security Functions		Detectors of abnormal status such as voltage, frequency and so on, watchdog timer, random number generator, etc.
Internal Operating Frequency/Operating Voltage		1 MHz to 10 MHz / 5 V
		1 MHz to 10 MHz / 3 V
		1 MHz to 10 MHz / 1.8 V
Shipment Form		Wafer (unsawn, sawn), COT