Hitachi Releases Smart Card Microcontrollers with Built-in MasterCard M/Chip™ Application for MasterCard® Smart Cards

— Provides easier development of MasterCard smart cards, enhanced functionality, and rapid card issuance —

Tokyo, November 5, 2002— Hitachi, Ltd. (TSE: 6501) today announced the development of new versions of the previously released AE45C and AE43C 16-bit microcontrollers featuring on-chip mask ROM and built-in MasterCard M/Chip™*[1] (below, M/Chip) application for smart cards from MasterCard International Incorporated*[2] (below, MasterCard). Volume production is scheduled to begin in December 2002.

In recent years the financial field has been moving from conventional magnetic cards to smart cards offering more sophisticated security features and functionality for applications such as credit cards, debit cards, and bank ATM cards. MasterCard, one of leaders in the payments industry, drives to provide a wide variety of global services based on its own global network and has developed the M/Chip smart card application to enable the credit and debit card services provided by MasterCard on smart card. M/Chip complies with the EMV specifications*[3]. M/Chip Select is an operating system for smart cards that runs on MULTOS™*[4] for smart card OS and supports the full specifications of M/Chip.

Up to now card manufacturers have incorporated the M/Chip application into smart cards. This was accomplished by writing the M/Chip program to on-chip EEPROM of the smart card microcontroller. However, using the EEPROM in this way leaves less free space to store other application software and data. This makes it difficult to upgrade the functionality of existing smart cards, because it is not possible to add programs for implementing other functions. In addition, the necessity to write data to EEPROM made the rapid production and issuance of smart cards problematic. Thus, there was a need for the countermeasure to these problems and a more efficient, rapid way to issue new cards.

Hitachi has developed AE45C and AE43C with built-in M/Chip application as a response to the need to produce and issue smart cards rapidly while preserving the EEPROM for other uses. They consist of the AE45C and AE43C 16-bit smart card microcontrollers, which Hitachi had already been producing in quantity, with the M/Chip Select software stored into on-chip mask ROM under cooperation with Dai Nippon Printing Co. Ltd.

The AE45C and AE43C were developed specifically for use in smart cards and incorporate the AE-4 16-bit CPU core and 32 kbytes (AE45C) or 8 kbytes (AE43C) of on-chip EEPROM. They have encryption coprocessor as well as abnormal voltage and frequency detection functions, making them suitable for use in smart cards requiring a high level of security.

Since the entire EEPROM capacity of the AE45C and AE43C can be used for storing data or programs, the functionality of the smart cards can be upgraded. In addition, since the M/Chip application is already incorporated, card manufacturers can easily and quickly issue credit cards and debit cards for MasterCard smart cards.

Hitachi plans to continue to enhance its lineup of products in the years ahead in response to market requirements.

Notes: 1. MasterCard M/Chip™ is an applied-for trademark of MasterCard International Incorporated or its subsidiaries in the United States. M/Chip is a application software developed by MasterCard for use in smart cards such as credit and debit cards.

2. MasterCard® is a registered trademark or service mark of MasterCard International Incorporated or its subsidiaries in the United States.

3. The EMV specifications (EMV stands for Europay/MasterCard/Visa), a set of international industry specifications for smart cards for financial applications, are being promoted by Europay International (now MasterCard Europe), MasterCard International, and Visa International. These specifications cover smart cards, terminals, software, etc.

VISA® is a registered trademark of VISA International.

4. MULTOS stands for Multi-Application Operating System and is an operating system for smart cards that supports multiple software applications. MULTOS 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.

Other company and product names are trademarks or registered trademarks of their respective companies.

< Typical Applications >

MasterCard smart card (credit cards and debit cards)

< Prices in Japan >(For Reference)

Product Code	Shipment Form	Unit Price for 10,000-Unit Lot (Yen)
AE45C built-in M/Chip	Wafer (unsawn, sawn), COT(Chip on Tape)	620 ~ 720
AE43C built-in M/Chip	Wafer (unsawn, sawn), COT(Chip on Tape)	500 ~ 600

< Specifications >

Product code		AE45C built-in M/Chip	AE43C built-in M/Chip
CPU Core		AE-4	
Memory	EEPROM (byte)	32 K	8 K
	ROM (byte)	96 K	64 K
	RAM (byte)	4 K	2 K
Coprocessor		• "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 8 MHz / 5 V 1 MHz to 8 MHz / 3 V	1 MHz to 8 MHz / 5 V 1 MHz to 8 MHz / 3 V
Shipment Form		Wafer (unsawn, sawn), COT	