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Renesas Technology Develops Future 32-bit RX600 Series CISC MCUs, Based on Renesas' Next-Generation 'RX' Architecture

— The RX600 Series will offer maximum 250 MIPS performance and excellent code efficiency, meeting future needs of diverse embedded system applications —

TOKYO, May 20, 2008——Renesas Technology Corp. today announced the development of the RX600 Series microcontrollers (MCUs), re-defining performance capabilities of CISC (Complex Instruction Set Computer)*[1] based MCUs. The new devices, scheduled for sample shipment in the second quarter of 2009, will be the first 32-bit products to incorporate the next-generation 'RX' CPU architecture and offer CPU performance of up to 200MHz, with the industry's fastest single-cycle flash access capability (100MHz).

The RX Family is being developed in response to the changing market needs for high-speed, high-performance, large capacity on-chip memory and power sensitive MCUs to support the growing complexity and performance demand of embedded systems. With the launch of the RX Family, Renesas aims to take advantage of the high growth 32-bit application space by providing a scalable CISC architecture. Renesas announced the development of a next-generation CISC CPU core architecture in May 2007. Completion of the design of the RX architecture was announced in November 2007.

"The RX Family is destined to become a mainstay of Renesas' future MCU business," said Yasushi Akao, board director and general manager, MCU business group, Renesas Technology Corp. "The new product line will comprise next-generation devices that complement and enhance the company's existing 16-bit and 32-bit CISC MCUs. Besides the new 32-bit RX600 Series, the RX Family will also include the 16-bit RX200 Series, devices targeted at applications that need low power consumption and high speed."

The devices will have up to 4MB on-chip flash, up to 256KB SRAM and highly integrated advanced peripheral functions. They will also be upward-compatible with Renesas' current product lines, providing customers an easy upgrade path to higher performance devices.

Renesas will continue to develop and mass-produce existing families of 16-bit and 32-bit CISC MCUs: the M16C Family, H8S Family, H8SX Family, and R32C Family. These popular devices serve a vast span of application areas, especially the consumer, automotive, industrial, office automation, and communication fields. With these product lines, Renesas holds the No1 share of worldwide MCU business*[2] and the global 16-bit MCU market*[3].

< Features >

The RX600 Series MCUs are designed for high-end embedded system applications, particularly those in the office automation, digital consumer product, white-goods, automotive, and similar fields. Such applications require high speed and fast processing performance and the ability to handle large programs. Features of RX600 Series MCUs include the following:

(1) Fast, high-performance, code-efficient*[4] RX CPU core

The RX CPU core is capable of 200MHz operation. It has a Harvard architecture with a 5-stage pipeline and can perform program reads and data writes in parallel, enabling 1.25 MIPS/MHz processing performance (Dhrystone 2.1 benchmark). The CPU's instruction set is optimized, resulting in a 30-percent boost in code efficiency compared to current Renesas products.

(2) On-chip flash memory capable of 100MHz high-speed operation

The RX600 Series incorporates Renesas' proprietary MONOS (Metal Oxide Nitride Oxide Silicon) flash memory with single-cycle read capability at 100MHz — the industry's fastest. The flash memory's read speed and large capacity (up to 4MB) accommodate more complex application programs that perform better and provide greater functionality. In addition, all RX600 Series chips have a special area of on-chip flash memory that is guaranteed for up to 100,000 rewrites and can be used for nonvolatile data storage. This flash works with a BGO (Background Operation) function, enabling parallel flash memory programming during program execution, making it ideal for data backup and other uses.

(3) Market-proven on-chip peripheral functions, and compatibility with existing products

The new series features on-chip peripheral functions (such as a timer, serial interface, A/D converter, and D/A converter) that have established a proven track record in current Renesas products. These functions allow existing software assets to be employed with the same ease of use as with current products, for shorter system development times.

(4) MCU Development Platform for speedy product development

Renesas uses its EXREAL Platform™*[5], an integrated mother platform, to implement new SoC (System on Chip) products. Now the concept of this successful development system has been applied to construct the 'MCU Development Platform' for MCUs. This advanced support product facilitates speedy RX Family chip development and product deployment.

(5) Extended functions tailored for diverse applications

A variety of functions can be installed as options on RX600 Series devices.

One such function is a memory protection unit. This function controls whether or not specific software can gain access to a restricted storage area, allowing for heightened system security. Another option for the new series devices is a single-precision floating-point unit and DSP function for accelerating the execution of filter operations and algorithm computations. These capabilities are essential for the high-speed processing of image and audio data.

Renesas' standard development environment, the High-performance Embedded Workshop, will also provide total support for the new devices as well as its existing MCUs. This will simplify the migration of software resources from the existing products to MCUs based on the new CPUs, and accelerate the development and debugging of new software.

The initial product in the RX600 Series is scheduled for sample shipment in the second quarter of 2009. Renesas also plans to offer ASSP (Application Specific Standard Product) versions of RX600 chips that will incorporate such in-demand peripheral functions as a USB module (Host/Function), CAN interface, Ethernet module, and motor-control timer.

About Renesas Technology Corp.

Renesas Technology Corp. is one of the world's leading semiconductor system solutions providers for mobile, automotive and PC/AV (Audio Visual) markets and the world's No.1 supplier of microcontrollers. It is also a leading provider of LCD Driver ICs, Smart Card microcontrollers, RF-ICs, High Power Amplifiers, Mixed Signal ICs, System-on-Chip (SoC), System-in-Package (SiP) and more. Established in 2003 as a joint venture between Hitachi, Ltd. (TSE:6501, NYSE:HIT) and Mitsubishi

Electric Corporation (TSE:6503), Renesas Technology achieved consolidated revenue of 951 billion JPY in FY2007 (end of March 2008). Renesas Technology is based in Tokyo, Japan and has a global network of manufacturing, design and sales operations in 17 countries with 26,800 employees worldwide. For further information, please visit http://www.renesas.com

< Notes >

Notes: 1. CISC (Complex Instruction Set Computer): A computer that has a complex instruction set. In contrast, a RISC (Reduced Instruction Set Computer) is a computer whose object is to simplify and speed up hardware by simplifying the instruction set. A CISC CPU has a large number of instructions, making programming comparatively easy.

2. Source: Gartner "Semiconductor Applications Worldwide Annual Market Share: Database" Hiroyuki Shimizu, 27 March 2008, GJ08218

3. Source: Gartner "Semiconductor Applications Worldwide Annual Market Share: Database" Hiroyuki Shimizu, 27 March 2008, GJ08219

4. Code efficiency: An indicator of program compactness. When object code efficiency is high, less memory capacity is required for program storage.

5. EXREAL (Excellent-Reliability, Efficiency, Agility, Link): A Renesas Technology integrated mother platform supporting SoC (System on Chip) chip development through user system development.

< **Specifications** >

Item	**RX600 Series Basic Configuration**
CPU core	RX CPU, 32-bit CISC type
Maximum operating frequency	200MHz
Power supply voltage	3.0V or 3.3V or 5.0V
General registers	32 bits × 16
Floating-point processing unit	Single-precision floating-point processing unit (Supports add/subtract/compare/multiply/divide and other instructions)
Memory protection unit	Yes (option)
DSP unit	Yes (option)
Multiplier	32-bit multiplier
Divider	Yes
Flash ROM (for program storage)	256KB to 4MB
Flash ROM (for data storage)	Yes
RAM	64KB to 256KB
On-chip peripheral functions	Timer
	Serial interface
	A/D converter
	D/A converter
On-chip debugging function	Yes
Performance (target)	1.25 MIPS/MHz

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