Renesas Technology to Release SH7266 and SH7267 32-bit MCUs with Large-Capacity (1.5 MB) On-Chip SRAM

SAN JOSE, Calif. — November 3, 2009 — Renesas Technology America, Inc., today announced the release of a total of eight versions of the SH7266 and SH7267, two new high-performance 32-bit MCU products with an on-chip SRAM size of 1.5 MB, that are intended for embedded applications in the industrial and consumer fields such as displays for digital audio players or graphical dashboards. Sample shipments will begin in February 2010 in Japan.

The SH7266 and SH7267 are the enhanced products of the SH7260 Series that belongs to the SuperH™*1 Family of high-performance 32-bit RISC MCUs. They each have 1.5 MB of large-capacity on-chip SRAM, an increase of 50% from the 1 MB of earlier MCUs in the SH7260 Series, to take the place of external synchronous DRAM (SDRAM). This makes it possible to implement a VGA display (640 × 480 pixels) without the need for external SDRAM. The large-capacity SRAM can be used as a display frame buffer or as a work area for storing programs or data.

The SH7266 is available in a 144-pin QFP package and the SH7267 in a 176-pin QFP package. Their main features are described below.

(1) Large-capacity (1.5 MB) on-chip SRAM that eliminates the need for external SDRAM

The SH7266 and SH7267 each have 1.5 MB of large-capacity on-chip SRAM that can be used in place of external SDRAM as a program or work area. The large-capacity SRAM can also be used as a display frame buffer for video data, eliminating the need to use external SDRAM for the frame buffer. When used as a frame buffer, the large-capacity SRAM can store two frames of video data in VGA format, an increase from the WQVGA format (480 × 240 pixels) of earlier products in the same series, which can be displayed on a TFT LCD panel via a display controller. This contributes to reducing overall system cost and size.

(2) Numerous graphical display functions

The SH7266 and SH7267 provide a new

video display controller and digital video input pins for use with graphical and video display applications. It supports functionality such as video recording, size reduction, alpha blending effects (superimposition of transparent or semitransparent images), and superimposition of video input. Digital RGB output pins allow output of images or video in RGB565 format (in which each color is represented by 16 bits: 5 bits for the red [R] component, 6 bits for green [G], and 5 bits for blue [B]) at up to VGA size.
This on-chip functionality makes it possible to develop products, such as car information systems with rear-view or side-view camera display and midrange or low-end graphical dashboard systems, using fewer devices and at a lower cost.

(3) Full complement of on-chip peripheral functions
The SH7266 and SH7267 each have a large number of on-chip peripheral functions, including Hi-Speed USB 2.0 (host and function modes). In addition to standard serial interfaces such as serial communication interfaces with 16-stage FIFO and I^2C bus interfaces, the SH7266 and SH7267 are equipped with serial sound interfaces for digital audio data I/O, a CAN*[2] interface, 16-bit timers including CMT and MTU2, and PWM timers for motor control. This array of on-chip peripheral functions provides support for a wide range of applications. Also integrated on-chip is a 16-bit external bus controller that enables direct connection to flash ROM, SDRAM, or SRAM without the need for additional external components.

< Product Background >

As embedded solutions for digital audio and display systems, Renesas Technology has already released a variety of products for industrial and consumer applications,

as well as automotive applications, in the SH7260 Series, which incorporates the SH2A-FPU 32-bit CPU core for superior real-time processing performance. In recent years, an increasing number of products in categories ranging from office equipment, such as a printer and household appliances, to game consoles and security systems employ display panels to show a wide variety of information, and demand for display capabilities continues to grow. There is also demand for functionality to display or record video signals from cameras. Renesas Technology already developed the new SH7262 and SH7264 with large-capacity (1 MB) SRAM to meet a wide range of requirements while contributing to reduced overall system cost.

Today there is demand for higher display resolutions, and the increasing complexity of systems means that more memory capacity is needed for storing programs and for use as work space. This has led to growing demand for MCU products with large-capacity on-chip SRAM.

In response, Renesas Technology has increased the on-chip SRAM capacity to 1.5 MB in the new SH7266 and SH7267.

< Product Details >

The SH7266 and SH7267 are built around the SH2A-FPU CPU core (which incorporates an FPU), have a maximum operating frequency of 144 MHz, and deliver excellent processing performance. The instruction set of the SH2A-FPU is backward compatible with the SH-2A and SH-2 CPU cores, allowing developers to reuse program code created for earlier products. In addition, ROM code efficiency has been improved approximately 75% in comparison with the SH-2. As a result, the object code for the same program can be compressed to about three-quarters the previous size, conserving the memory capacity available for storing programs.

In addition to the above, the peripheral functions have been supplemented as follows.

- In addition to NOR flash memory, the SH7266 and SH7267 allow connection of other external flash memory types such as NAND flash memory and serial flash memory. The device can be booted from a program read in from the external flash memory. These microcontrollers are, thus, excellent solutions for systems employing many different types of flash memory.
- Hi-Speed USB2.0 (host and function modes) is implemented on-chip. When host mode is selected, the device can connect to and communicate with multiple peripheral devices via a hub. Switching between the host and function modes is easily accomplished by register settings. The USB has a built-in USB transceiver that supports all data transfer types defined in the USB standard.
- A CD-ROM decoder and a sampling rate converter for converting the sampling frequency for audio data are implemented on-chip. These functions are required by digital audio devices. Other on-chip peripheral functions suitable for a variety of applications include a Renesas SPDIF

interface, a direct memory access controller, and a SD memory card interface.

These many on-chip peripheral functions enable developers to build systems delivering advanced functionality with a smaller number of total components. This contributes to reduced overall system cost.

The SH7266 and SH7267 are each available in four product versions with different combinations of CAN interface and IEBus*[3] interface availability, for a total of eight product versions. Additionally, each product version is available with an operating temperature range of either –40 to 85°C or –20 to 85°C, resulting in a total lineup of 16 product numbers. Customers can select the product version that best meets their requirements.

The SH7266 comes in a lead-free 144-pin QFP package and the SH7267 in a lead-free 176-pin QFP package. Both have an on-chip debugging function*[4] that enables real-time debugging at the maximum operating frequency. The E10A-USB emulator, which uses USB bus power and requires no external power supply, is available as a development environment.

Renesas Technology supplies middleware with support for digital audio compression standards such as MP3, WMA (Windows Media Audio)*[5], and AAC (Advanced Audio Coding). In addition, software is available that provides support for the ISO 9660 file system used by CD-ROM drives, the FAT32 file system used by hard disk drives, USB mass storage class drivers, and others. The available software libraries support devices requiring storage and communication capabilities, such as USB functionality for digital audio devices or embedded applications.

Future SH7260 Series microcontrollers for the high-end market will include multi-core products offering improved performance, expanded on-chip memory, and enhanced peripheral functions such as advanced display capabilities. Alongside these products offering more speed, better performance, and higher functionality, Renesas Technology will continue to respond to market demand with low-cost products for use in low-end systems.

< Notes >

Notes:

1. SuperH™ is a trademark of Renesas Technology Corp.
2. CAN (Controller Area Network) is an automotive network specification promoted by Robert Bosch GmbH of Germany.
3. IEBus™ (Inter Equipment Bus) is a trademark of NEC Electronics Corporation.
4. On-chip debugging function: A subset of the debugging circuits in conventional emulators. Implementing this functionality on-chip simplifies emulation using the actual device as part of system evaluation.
5. Microsoft and Windows are either registered trademarks or trademarks of

Microsoft Corporation in the United States and/or other countries.

*Other product names, company names, or brands mentioned are the property of their respective owners.

< Typical Applications >

- Digital audio: Car CD players, car audio system with built-in hard disk drives, etc.
- Graphical dashboard and vehicle display systems
- Industrial equipment: Sequencers, robots, etc.
- Office equipment: Copiers, printers, etc.

About Renesas Technology Corp.

Renesas Technology Corp. is the world's No.1 supplier of microcontrollers and one of the world's leading semiconductor system solutions providers for mobile, automotive and PC/AV (Audio Visual) markets. It is also a leading provider of Power MOSFETs, 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 702.7 billionJPY in FY2008 (end of March 2009). Renesas Technology is based in Tokyo, Japan and has a global network of manufacturing, design and sales operations in 16 countries with 25,000 employees worldwide. For further information, please visit http://www.renesas.com [1]

< Specifications >

(1) SH7266

* Top row: operating temperature range –40 to 85°C, bottom row: operating temperature range –20 to 85°C

Item	**SH7266 Specifications**			
Product name	SH7266			
Product No.*	R5S72660P144FP	R5S72661P144FP	R5S72662P144FP	R5S72663P144FP
	R5S72660W144FP	R5S72661W144FP	R5S72662W144FP	R5S72663W144FP
Power supply voltage	3.3 V/1.25 V			
Max. operating frequency	144 MHz			
Max. processing performance	144 MHz operation: 263 MIPS (Dhrystone 2.1), 288 MFLOPS			
Operating temperature range	-40 to 85°C or -20 to 85°C			

CPU core	SH2A-FPU			
CPU instructions	112 (including FPU-related instructions)			
On-chip RAM	1.5 Mbytes (for video display/ work area, 128 Kbytes also used for data storage) 64 Kbytes (high-speed on-chip memory)			
Cache memory	16 Kbytes (divided between instruction (8 KB) and data (8 KB), 4-way set associative)			
External memory	Bus clock max. 72 MHz			
	Support for direct connection of SRAM or SDRAM using bus state controller			
	Address space 64 Mbytes × 7			
	Data bus width: External 8/16 bits			
On-chip peripheral functions	Multifunction 16-bit timer (MTU2) × 5 channels			
	16-bit timer (CMT) × 2 channels			
	A/D converter (10-bit resolution) × 6 channels			
	USB 2.0 (Hi-Speed) specification, host or function selectable			
	Serial communication interface (SCIF) with 16-stage FIFO × 5 channels (support for asynchronous and clock-synchronous serial communication)			
	I^2C bus interface × 3 channels			
	Serial sound interface × 4 channels			
	Renesas SPDIF interface			
	Motor control PWM timer × 2 channels			
	NAND flash interface			
	Video display controller			
	SD host interface (SD card license required)			
	Real-time clock			
	CD-ROM decoder			
	Sampling rate converter			
	-	-	IEBus interface	IEBus interface
	-	CAN interface	-	CAN interface
	On-chip debugging functions • Advanced User Debugger II (AUD-II) • User Debugging Interface (H-UDI)			
	Direct memory access controller × 16 channels			
	Interrupt controller			
	Watchdog timer			
	Clock pulse generator (CPG): Built-in PLL, max. 12× multiplication			
Boot modes	Boot mode 0: Boot from memory connected to CS0 space			
	Boot mode 1: Boot from serial flash memory (low-speed communication)			
Power-down modes	Sleep mode			
	Software standby mode			
	Deep standby mode			

	Module standby mode
Package	144-pin QFP (20 mm × 20 mm, 0.5 mm pin pitch)

(2) SH7267

* Top row: operating temperature range –40 to 85°C, bottom row: operating temperature range –20 to 85°C

Item	**SH7267 Specifications**			
Product name	SH7267			
Product No.*	R5S72670P144FP	R5S72671P144FP	R5S72672P144FP	R5S72673P144FP
	R5S72670W144FP	R5S72671W144FP	R5S72672W144FP	R5S72673W144FP
Power supply voltage	3.3 V/1.25V			
Max. operating frequency	144 MHz			
Max. processing performance	144 MHz operation: 263 MIPS (Dhrystone 2.1), 288 MFLOPS			
Operating temperature range	-40 to 85°C or -20 to 85°C			
CPU core	SH2A-FPU			
CPU instructions	112 (including FPU-related instructions)			
On-chip RAM	1.5 Mbytes (for video display/ work area, 128 Kbytes also used for data storage) 64 Kbytes (high-speed on-chip memory)			
Cache memory	16 Kbytes (divided between instruction (8 KB) and data (8 KB), 4-way set associative)			
External memory	Bus clock max. 72 MHz			
	Support for direct connection of SRAM or SDRAM using bus state controller			
	Address space 64 Mbytes × 7			
	Data bus width: External 8/16 bits			
On-chip peripheral functions	Multifunction 16-bit timer (MTU2) × 5 channels			
	16-bit timer (CMT) × 2 channels			
	A/D converter (10-bit resolution) × 6 channels			
	USB 2.0 (Hi-Speed) specification, host or function selectable			
	Serial communication interface (SCIF) with 16-stage FIFO × 8 channels (support for asynchronous and clock-synchronous serial communication)			
	I^2C bus interface × 3 channels			
	Serial sound interface × 4 channels			
	Clock-synchronous serial I/O with FIFO			
	Renesas SPDIF interface			
	Motor control PWM timer × 2 channels			

	NAND flash interface			
	Video display controller			
	SD host interface (SD card license required)			
	Real-time clock			
	CD-ROM decoder			
	Sampling rate converter			
	-	-	IEBus interface	IEBus interface
	-	CAN interface	-	CAN interface
	On-chip debugging functions • Advanced User Debugger II (AUD-II) • User Debugging Interface (H-UDI)			
	Direct memory access controller × 16 channels			
	Interrupt controller			
	Watchdog timer			
	Clock pulse generator (CPG): Built-in PLL, max. 12× multiplication			
Boot modes	Boot mode 0: Boot from memory connected to CS0 space			
	Boot mode 1: Boot from serial flash memory (low-speed communication)			
	Boot mode 2: Boot from NAND flash memory			
	Boot mode 3: Boot from serial flash memory (high-speed communication)			
Power-down modes	Sleep mode			
	Software standby mode			
	Deep standby mode			
	Module standby mode			
Package	176-pin QFP (24 mm × 24 mm, 0.5 mm pin pitch)			

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SOURCE [2]

Source URL (retrieved on *07/22/2014 - 6:06pm*):
http://www.ecnmag.com/products/2009/11/renesas-technology-release-sh7266-and-sh7267-32-bit-mcus-large-capacity-15-mb-chip-sram

Links:
[1] http://www.renesas.com
[2] http://america.renesas.com/fmwk.jsp?cnt=press_release20091103.htm&fp=/company_info/news_and_events/press_releases&campaign=RSSNews