

## FOR IMMEDIATE RELEASE

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### **Renesas Technology to Release SH-MobileR2R Application Processor with HD Video Playback and Recording Support for PNDs, Car Navigation Systems and IP Security Cameras**

— Supports playback and recording of 1280x720 progressive video at 30 fps; 1.3 times faster than previous Renesas Technology products —

SAN JOSE, Calif., — May 27, 2009 — Renesas Technology America, Inc., today announced the release of the SH-MobileR2R (product name: SH7724), the third product in the SH-MobileR Series\*<sup>1</sup> of application processors for mobile devices designed for multimedia applications such as video and audio. The new SH-MobileR2R is intended for use in IP security cameras, car navigation systems and personal navigation devices (PNDs) supporting the terrestrial digital TV broadcast standard and delivers enhanced performance, including the ability to play and record high-definition (1,280 × 720 pixels, abbreviated below as HD) video. Sample shipments will begin in August.

The main features of the SH-MobileR2R are summarized below.

(1) Terrestrial digital TV broadcast support and HD video playback and recording

Terrestrial digital TV broadcast support is provided by the VPU5F (Video Processing Unit 5F) high-performance multi-codec video processing IP, which supports the H.264/MPEG-4 AVC\*<sup>2</sup> (abbreviated below as H.264) video compression standard used in several models of terrestrial digital broadcasts for mobile applications. In the SH-MobileR2R, the VPU5F delivers approximately 2.5 times the processing performance of the earlier SH-MobileR2, enabling encoding (recording) and decoding (playback) of HD video at 30 frames per second (fps).

MPEG-4 encoding/decoding and VC-1\*<sup>3</sup> decoding are also supported, providing compatibility with a wide range of video applications such as HD video cameras. It is also possible to add support for terrestrial digital broadcast formats used outside of Japan, such as DVB-H\*<sup>4</sup>, which is used in Europe; DMB\*<sup>5</sup>, which is used in South Korea; and CMMB\*<sup>6</sup>, which is used in China.

(2) Two camera module interfaces combined with VPU5F and JPU

There are two CEUs (Capturing Engine Unit) in the Video I/O which support up to 5M pixel image capture. The VPU5F has the flexibility to encode 1 channel of HD encode stream or 2 channels of standard-definition (720x480 pixels), abbreviated below as SD encode streams. The JPU (JPEG Processing Unit) supports the Motion JPEG encode stream. The SH-MobileR2R enables implementation of multiple video streams with different type of codec using a single chip.

(3) High operating frequency of 500 MHz for high-performance processing of tasks such as simultaneous two-screen display

The SH-MobileR2R is built around the SH-4A high-performance CPU core, which is also incorporated in products designed for high-end built-in car navigation systems and integrates a floating-point processing unit (FPU) to improve the efficiency of video and audio processing. In the SH-MobileR2R, the maximum operating frequency of the CPU has been boosted to 500 MHz, approximately 1.3 times as fast as the existing product, SH-MobileR2. When operating at 500 MHz, general processing performance is 900 million instructions per second (MIPS) and FPU processing performance is 3.5 giga [billion] floating-point operations per second (GFLOPS). This enables parallel processing of multiple applications, such as simultaneous dual-screen display of both the car navigation system screen and a rear monitor screen, and provides ample processing power to handle a general-purpose OS such as Windows® CE\*<sup>7</sup> or Linux\*<sup>8</sup>, either of which imposes a larger processing load than a custom OS would.

As in the existing SH-MobileR2, the SH-MobileR2R integrates on-chip 64 kilobytes of primary cache memory (32 kilobytes each for instructions and data) and a full 256 kilobytes of secondary cache memory (for both instructions and data). This contributes to faster software processing. In addition, the synchronous DRAM (SDRAM) interface supports connections to both 1.8 V DDR2 (Double Data Rate 2) and MobileDDR, which is very useful for battery-powered devices requiring low power consumption.

(4) Full complement of high-performance peripheral functions for multimedia applications

For map rendering, the SH-MobileR2R integrates a 2-D graphics accelerator that delivers better rendering performance than the existing SH-MobileR2. This enables high-quality map rendering at high speed.

For audio processing, the SH-MobileR2R has a 24-bit dedicated audio DSP that supports compression formats that include Advanced Audio Coding (AAC), MP3, and Windows Media Audio (WMA)\*<sup>7</sup> with plenty of processing power to spare. Since the 24-bit dedicated audio DSP also handles the aacPlus(Advanced Audio Coding Plus)\*<sup>9</sup> audio compression format used by terrestrial digital broadcasts, this processing no longer needs to be performed by software. The resulting reduction in the CPU's processing load is equivalent to approximately 50 MHz. This reduces power consumption, enabling TV broadcasts to be watched for a longer period of time.

The many on-chip peripheral functions include a 24-bit TFT color LCD controller, two USB 2.0 Host/Function modules (with high-speed data transfer mode support), an ATAPI controller for connecting a hard disk or DVD drive, two SD\*<sup>10</sup> host controllers with support for high-speed data transfer mode, and an Ethernet MAC (Media Access Control) controller for applications such as IP security cameras that supports connection to a 10M/100M bps (bits per second) Ethernet LAN. This full complement of high-performance functions helps to reduce the number of components in the system and to lower the overall cost while maintaining excellent performance.

Software solutions are provided for the total system, including video middleware supporting H.264, MPEG-4, and Windows Media Video (WMV)\*<sup>9</sup>, and audio middleware supporting aacPlus.

### < Product Background >

In recent years, an increasing number of multimedia devices supporting terrestrial digital broadcasts have appeared on the market, including mobile phones, car navigation systems, and portable media players. In the car navigation system field in particular, more and more built-in car navigation systems and simple car navigation systems, such as PNDs, now provide functions supporting digital TV broadcasts. This trend is expected to continue in the future.

With its SH-Mobile Series of application processors for mobile phone systems, Renesas Technology was one of the first to deliver products with support for terrestrial digital broadcasts. The SH-Mobile Series has achieved wide adoption in many mobile phone models. The company then launched the SH-MobileR Series to broaden the field of applications beyond mobile phones and provide support for a variety of functions and configurations along with excellent flexibility. The second product in this

series, the SH-MobileR2, has received a favorable response from manufacturers of terrestrial digital TV-broadcast-capable PNDs and car navigation systems. Now, in response to demand for enhanced performance and functionality, such as support for HD video, Renesas Technology is releasing the SH-MobileR2R. It is approximately 1.3 times faster than its predecessor, the SH-MobileR2, and delivers high performance, including support for HD video playback and recording, while contributing to reduced power consumption and lower system cost.

### < Product Details >

The SH-MobileR2R has two on-chip SD host controllers with support for high-speed data transfer mode, and two SD memory card interfaces support the Content Protection for Recordable Media (CPRM) specification as an option. This makes it possible to implement playback and recording functionality for terrestrial digital TV broadcasts. There is also a 10M/100M bps Ethernet MAC controller and a two-channel camera module interface, making it easy to provide IP camera solutions at low cost.

A number of system solutions will be made available to help customers shorten development period and reduce system costs, including a reference platform incorporating the SH-MobileR2R and a graphics library that supports the functions of the 2-D graphics accelerator.

The reference platform makes it possible to study system functions, evaluate performance, and develop software efficiently. The graphics library conforms to the GDI-Sub\*<sup>11</sup> specification, which supports Windows® Automotive 5.0\*<sup>12</sup> Service Pack 2 from Microsoft Corporation, enabling customers to realize a wide variety of map rendering functions using the 2-D graphics accelerator.

There are also plans to provide support packages for IP camera devices and the like, including Linux BSPs and video codec middleware.

Two package options are available to enable more compact systems: 449-pin BGA (21 mm × 21 mm, 0.8 mm pin pitch) and 441-pin POP-compatible BGA (14 mm × 14 mm, 0.5 mm pin pitch).

Renesas Technology will continue to develop solutions for increasingly advanced and sophisticated multimedia application systems, extending the SH-Mobile Series by releasing new products that meet market demand in a timely manner.

### < Notes >

- Notes: 1. SH-MobileR Series: A series of products in the SH-Mobile (SuperH™ Mobile Application Processor) Series of application processors that are intended for mobile devices other than mobile phones. These application processors are exclusive to Renesas Technology and are designed specifically for multimedia applications such as video and audio.
- SuperH is a trademark of Renesas Technology Corp.
2. H.264/MPEG-4 AVC (Advanced Video Coding) is a video compression standard established jointly by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) and the international standardization organizations ISO/IEC.
  3. VC-1: A video compression standard established by SMPTE (Society of Motion Picture and Television Engineers).
  4. DVB-H (Digital Video Broadcasting for Handhelds): A mobile device version of the Digital Video Broadcast (DVB) standard developed in Europe.
  5. DMB (Digital Multimedia Broadcasting): A digital TV broadcasting standard for mobile devices developed in South Korea. There are two versions: Terrestrial DMB (T-DMB) and Satellite DMB (S-DMB).

6. CMMB(China Mobile Multimedia Broadcasting): A digital TV broadcasting standard for mobile devices developed in China.
7. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
8. Linux is a registered trademark of Linus Torvalds in the United States and other countries.
9. aacPlus is a trademark of Coding Technologies.
10. An SD card license must be obtained in order to use an SD card.
11. GDI-Sub: A graphic framework exclusive to Windows Automotive that provides call instruction compatibility with the GDI (Graphics Device Interface). It is designed specifically for high-speed rendering of GUI and map elements and is optimized to extract the maximum performance from the graphics chip.
12. Windows Automotive is an embedded operating system for car information terminals developed by Microsoft Corporation.

**< Typical Applications >**

- Car navigation systems and personal navigation devices (PNDs) with support for terrestrial digital broadcasting
- Portable media players and other mobile devices with support for terrestrial digital broadcasting
- IP security cameras and V2IP (video and voice over IP) terminals with support for terrestrial broadcasting

<b>SH-MobileR2R Product Name (Product No.)</b>	<b>Max. Operating Frequency</b>	<b>Operating Temperature Range</b>	<b>Package</b>	<b>Price in 10,000 quantities</b>
SH7724 (R8A77240D500BG)	500 MHz	-40 to 85°C	449-pin BGA	36.00
SH7724 (R8A77240B500BB)	500 MHz	-20 to 70°C	441-pin POP- compatible BGA	31.00

**Note to Editors:**

A specification summary of the SH-MobileR2R is available with the press release at <http://america.renesas.com>.

**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 billion JPY 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>

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< Specifications >

Item	SH-MobileR2R Specifications	
Product name	SH7724(R8A77240D500BG)	SH7724(R8A77240B500BB)
Operating temperature range	-40 to 85°C	-20 to 70°C
CPU core	SH-4A (with MMU)	
Max. operating frequency	500 MHz	
Max. processing performance	900 MIPS, 3.5 GFLOPS (at 500 MHz)	
Cache memory	Primary cache: 32 Kbytes instruction/32 Kbytes data, separate Secondary cache: 256 Kbytes instruction/data, shared	
Media data RAM	128 Kbytes	
On-chip RAM	16 Kbytes	
External memory	<ul style="list-style-type: none"> <li>• Dedicated controller for DDR2/MobileDDR</li> <li>Connection via 32-bit bus, max. operating frequency: 166.7 MHz</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated controller for MobileDDR</li> <li>Connection via 32-bit bus, max. operating frequency: 166.7 MHz</li> </ul>
	<ul style="list-style-type: none"> <li>• Local bus controller</li> <li>Support for connection to ROM, SRAM, PCMCIA, etc., connection via 16-bit or 32-bit bus, max. operating frequency: 83.3 MHz</li> </ul>	
Main on-chip peripheral functions	<ul style="list-style-type: none"> <li>• Video I/O (camera module direct connection interface)</li> <li>• Video image processing functions (color conversion, image enlargement/reduction, filtering)</li> <li>• Image blending function</li> <li>• VPU5F (H.264, MPEG-4, VC-1)</li> <li>• JPU(JPEG encode, decode)</li> <li>• Video output unit</li> <li>• LCD controller with support for 24-bit TFT color LCD panels</li> <li>• 2-D graphics accelerator</li> <li>• Sound processing unit (24-bit dedicated audio DSP)</li> <li>• USB 2.0 Host/Function controller (with high-speed mode support) × 2 channel</li> <li>• ATAPI interface</li> <li>• TS interface</li> <li>• DMAC × 12 channels</li> <li>• FIFO serial interface × 1 channel</li> <li>• 32-bit timer unit × 6 channels</li> <li>• 32-bit compare-match timer × 1 channel</li> <li>• 16-bit timer pulse unit × 4 channels</li> <li>• Realtime clock × 1 channel</li> <li>• Watchdog timer × 1 channel</li> <li>• I<sup>2</sup>C bus interface × 1 channel</li> <li>• Key scan interface</li> <li>• Asynchronous/clock-synchronous serial interface × 6 channels</li> <li>• IrDA interface (with v1.2a support)</li> <li>• MMC4.2-compliant NAND interface</li> <li>• SD memory/SDIO card interface × 2 channels</li> <li>• Ethernet MAC (10M/100M bps)</li> <li>• H-UDI on-chip debug function</li> </ul>	

Power-down (low-power) modes	<ul style="list-style-type: none"> <li>• Sleep mode</li> <li>• Standby mode</li> <li>• R standby mode</li> <li>• U standby mode</li> </ul>	
Package	<ul style="list-style-type: none"> <li>• 449-pin BGA (21 mm x 21 mm, 0.8 mm pin pitch)</li> </ul>	<ul style="list-style-type: none"> <li>• 441-pin POP-compatible BGA (14 mm x 14 mm, 0.5 mm pin pitch)</li> </ul>

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