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Renesas Technology to Release SH-MobileHD1 Application Processor for Mobile Phones That Is First in Industry to Offer Full HD Video Recording and Playback Support

Provides low-power 1080p video encoding in a small package, enabling low power applications for compact HD video and audio processing systems

SAN JOSE, Calif. — April 29, 2009 — Renesas Technology America, Inc., today announced the SH-MobileHD1 application processor (product number: SH7370), the first in the industry to deliver low-power Full High-Definition (1,920 × 1,080 pixels, abbreviated "Full HD") video recording, playback, and streaming support key for the next generation of IP video applications. Sample shipments will begin on April 23, 2009 in Japan.

The high-definition video processing unit of the SH-MobileHD1 enables an HD video surveillance system that consumes less power than typical standard-definition systems. The unique hardware approach to this video processing unit requires very few cycles of the on-board general purpose processor, leaving ample capability for applications such as analytics or a rich user interface. This is critical to meet energy regulations and power-over-network requirements while delivering high system throughput. In addition to the low-power consumption essential for a wide range of streaming video applications, this new solution also features support for a wide range of high-definition video standards addressing broadcast, networked video, camera-based, media and video telephony applications. It is available in a small package with integrated system memory designed to facilitate more compact video and audio processing systems for power sensitive applications.

The main features of the SH-MobileHD1 are summarized below:

(1) Full HD video processing on a single chip

It supports the H.264/MPEG-4 AVC*[1] video compression standard (H.264) at Full HD video resolution with a playback/recording frame rate of 30 frames per second (fps).

- Maximum operating frequency of 500 MHz, approximately twice as fast as comparable earlier Renesas Technology products
- Video processing unit (VPU) delivering 1080p video encoding and decoding requiring very few CPU MIPS
- Video input interface for camera module conforming to Mobile Industry Processor Interface (MIPI) CSI-2 standard
- Enhanced higher bandwidth internal bus architecture

(2) Dedicated audio DSPs for reduced power consumption

The SH-MobileHD1 incorporates two 24-bit dedicated audio DSPs to lighten the audio processing load on the CPU and reduce power consumption. This enables one DSP to handle (stereo) audio processing such as the AAC (Advanced Audio Coding) high-quality audio compression standard and Dolby Digital codec, while the other DSP handles sonic enhancement such as equalization and sample rate conversion (SRC). In addition, heavy-load processing tasks such as 5.1-channel audio can be assigned to the dual DSPs. Support for Dolby Digital and 5.1-channel audio allow interoperation with applications designed for consumer audio components.

(3) Improved interoperation with digital home electronics and networks

The SH-MobileHD1 includes an interface that supports connection to a transmitter microchip that implements the HDMI high-speed multimedia interface used for interconnections between AV components. This allows connection and output of Full HD resolution video to digital home electronics components such as LCD TVs or Blu-ray Disc recorders. In addition, the SH-MobileHD1 can connect to an SD memory card and wireless LAN (WLAN) module, and it supports multiplexing*[2] of the MPEG2-TS (transport system) and MP4*[3] formats. Since MPEG2-TS is rapidly gaining popularity as a multiplexing format for HD and Full HD video in the digital home electronics field, support by the SH-MobileHD1 enables easy sharing of content between digital home electronics products and mobile phones. High resolution camera data or host-based content can be shared easily over a network such as a WLAN. This helps increase the usability of video applications.

(4) Small package

The SH-MobileHD1 supports Full HD video, but uses a compact 407-pin BGA package measuring 10 mm × 11 mm. The application processor and 512 megabits of synchronous DRAM (SDRAM) are integrated into a single package as a system-in-package (SiP) device for greater system compactness.

< Product Background >

In recent years, streaming video applications have grown rapidly from movies on-demand to videos captured on mobile phones and uploaded to the Internet. Many of these applications deploy video engines capable of standard definition or less. However, the market quickly wants to move to megapixel IP Video applications, requiring a device like the SH-MobileHD1 to compress in high quality the large amount of data from high resolution images. Overcoming prior generation resolution problems and problems with picture quality has been a key to unlocking advance IP Video applications. Availability of a device like the SH-MobileHD1 is expected to lead to demand for mobile phones, video surveillance cameras, video telephony, and streaming media products capable of recording and playing back HD and Full HD content.

< Product Details >

The video processing unit (VPU) of the SH-MobileHD1 incorporates video processing IP enabling better performance and reduced power consumption. It delivers approximately six times the performance of Renesas Technology's earlier SH-MobileL3V2. It performs MPEG2-TS multiplexing in hardware using an EMUX module.

• The VPU can encode or decode Full HD resolution video at a rate of 30 fps and 40 Mbps while maintaining low power consumption. The CPU is free for other processing tasks while the VPU is performing video processing. This makes it possible to keep the operating frequency low, reducing the power consumption of the SH-MobileHD1 even further.

• The EMUX module can handle MPEG2-TS multiplexing of up to 40 megabits per second (Mbps) at its maximum operating frequency of 166 MHz. Its operation can be modified to match the customer's system configuration by updating the firmware.

The SH-MobileHD1 also has a camera interface that supports direct connection to a 15-megapixel camera module. This allows high-speed importing of large blocks of data from a high-resolution camera and makes possible a variety of display functions, including electronic zoom and superimposed effects such as an on-screen display (OCD) function or hardware cursor (HWC) function. There is also compatibility with BT.709 format YUV data as part of the support for One-Seg*[4] TV broadcasts. This makes it possible to convert snippets of TV broadcast data to JPEG format with no degradation in image quality. The many on-chip peripheral functions suitable for mobile phone systems also include an LCD controller with support for 24-bit TFT color LCD panels and a sound interface.

Renesas Technology will continue to add new products to the SH-Mobile[5] Series as the multimedia applications of mobile phones grow more advanced and sophisticated, delivering products optimized to meet market requirements in a timely manner.

< Notes >

Notes: 1. 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.

2. Multiplexed: As used in this press release, the term multiplexing refers to the synchronizing and combining of a video file and an audio file into a single file.

3. MP4 format: A file format in which compressed video data, such as MPEG-4 or H.264, and compressed audio data, such as AAC, are multiplexed.

4. One-Seg: A service offering terrestrial digital broadcasts in Japan for mobile and portable devices.

5. SH-Mobile (SuperH™ Mobile Application Processor): An exclusive Renesas Technology processor for mobile phone systems that is connected to a baseband processor and performs dedicated processing for multimedia applications using audio and video.

* SuperH is a trademark of Renesas Technology Corp. Other product names, company names, or brands mentioned are the property of their respective owners.

< Typical Applications >

- Mobile phone handsets incorporating multimedia applications
- Mobile devices for the consumer market incorporating video applications

< Part Number >

Product Name (Product No.)	Operating Frequency	Package	Price in 10K Quantities
SH-MobileHD1(SH7370)	500 MHz	407-pin BGA	$40.86

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

< **Specifications** >

Item	**SH-MobileHD1 Specifications**
Product name	SH7370
CPU core	SH4AL-DSP
Power supply voltage	Internal: 1.15 V to 1.3 V External: 2.5 V to 3.6 V or 1.65 V to 1.95 V
Max. operating frequency	500 MHz
On-chip RAM	• ILRAM: 4 Kbytes • RSRAM: 2 Kbytes
Cache memory	32 Kbytes instruction/32 Kbytes data, separate, 4-way set associative
X/Y memory (for DSPs)	16 Kbytes
On-chip peripheral functions	• Support functions for 15-megapixel camera
	• VPU (H.264, MPEG-4, MPEG2)
	• DMAC × 6 channels
	• MMU
	• SPU (24-bit dedicated audio DSP × 2)
	• LCD controller with 24-bit TFT color LCD panel support
	• Gamma correction function
	• Enlarged edge enhancement function
Interfaces	• Dedicated interface (for connection to baseband processor, etc.)
	• Transport stream (TS) interface
	• HDMI transmitter chip interface
	• Video I/O (direct interface to camera module)
	• I^2C bus interface
	• Clock-synchronous serial interface × 1 channel
	• Serial interface with FIFO × 1 channel
	• Asynchronous serial interface × 1 channel
	• Sound interface unit × 2 channels
	• SD memory card interface × 2 channels
	• High-speed serial interface (sub-LVDS)
On-chip SDRAM	512 Mbits
Package	407-pin BGA (10 × 11 mm, 0.4 mm pin pitch, 1.4 mm thick)

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