

Renesas Technology Releases the High-Performance and Compact SH77722 (SH-NaviJ2) as the Second-Phase Product in the SH-NaviJ Series of SoCs for Low-End to Middle-range Car Navigation Systems

— Achieved two-screen displays by doubling the bus width for DDR2 SDRAM interface —

Tokyo, May 7, 2009 - Renesas Technology Corp. today announced the SH77722 (SH-NaviJ2) as the second-phase product in the SH-NaviJ Series, which are SoC (System on Chip) products for compact portable navigation systems and low-end through middle-range dashboard-mounted car navigation systems. The SH77722 features even higher performance, improved ease of use, and miniaturization. Sample shipments will begin in July 2009 in Japan.

While Renesas now boasts the industry's top share*¹ in the dashboard-mounted car navigation field and Renesas products are widely used in high-end products, Renesas is also expanding its line of products that target low-end and middle-range equipment, an area in which rapid growth is expected, to respond to even more customer needs and to increase its market share.

The SH-NaviJ Series are SoC products that implement car navigation systems compactly in a single chip, while at the same time taking advantage of a sophisticated on-chip graphics rendering engine for high-quality map drawing and other graphical functions and high quality of Renesas' products for high-end equipment. This series is also strictly selecting functionality appropriate for low-end to middle-range equipment. The SH77722 (SH-NaviJ2) of this release is further improved in the following areas.

- (1) A 32-bit bus for the DDR2 SDRAM memory interface allows the SH77722 to implement higher-speed advanced graphics functions.

Data transfer efficiency has been increased by doubling the bus width of the DDR2 SDRAM (double data rate 2 synchronous DRAM) memory interface from 16 to 32 bits. This makes it possible for the SH-NaviJ2 to draw a wide variety of advanced 3-D graphics such as map and GUI (graphical user interface*²) at higher-speed.

- (2) Two-screen displays support for implementing a wide range of applications

Two-screen displays are achieved by mainly doubling the bus width for DDR2 SDRAM. For example, this product can output a total of two screen displays of graphics and others in the WVGA size (832 × 496 pixels). (In case of one display only, SH77722 can output graphics and others in the maximum WXGA size [1280 × 768 pixels]) One channel supports digital RGB output and the other channel includes an LVDS*³ interface. This LVDS interface provides low-noise, high noise resistance, and high-speed data transmission, which makes it possible to transmit image data to a remote monitor with a minimal number of lines.

Together, these make it possible to implement systems in which, for example, one channel is used for the car navigation display and the other is used for a rear monitor in the back of the car, which displays different content. This increases the range of applications that can be implemented.

- (3) In-car network functionality strengthened by the inclusion of a MOST interface and other functions

There are now increasing demands for in-car coordination systems to improve both safety and comfort by providing coordination between the in-car electronic equipment in the information systems, including car navigation, and the in-car electronic equipment in the control system for the power train and body. To respond to these needs, the SH77722 increases from one to two the number of CAN*⁴ interface channels, which is the industry standard automotive network.

Furthermore, the SH77722 now includes a MOST (Media Oriented Systems Transport) interface, which is the standard automotive network for information systems. This makes it easy to implement a LAN that connects the automotive information system equipment in the car.

- (4) Line up of two devices that are the different maximum operating frequencies enables a variety of car information systems to be handled

The SH77722 is provided in two versions, one with a 336 MHz maximum operating frequency and 600 million instructions per second (MIPS) processing performance, and one with 400 MHz and 720 MIPS. This line up allows the user to choose a more suitable SoC for his particular system.

- (5) Compact package reduced in size by 17% from the earlier package

Despite providing increased functionality, such as the MOST interface, over the SH-NaviJ1, the SH-NaviJ2 is provided in a 21 × 21 mm 449-pin BGA package that reduces the mounting area by 17%. Thus the SH77722 can also contribute to system miniaturization.

< Product Background >

In recent years, the PND (personal navigation device) compact basic car navigation system has become a hit product in the US and European markets, and its market is expanding. Along with this there is hope that there will be increasing demand for low-end and middle-range car navigation products such as memory navigation systems, which are compact and use flash memory as the storage medium for map data. Furthermore, since there are increasing needs for higher functionality and improved ease of use, car navigation system manufacturers find it necessary to develop low-end and middle-range products in parallel with the development of high-end equipment, and the speed of these development efforts is increasing as well. As a result, there is now demand for SoC products that can implement high-functionality and compact car navigation systems that support flash memory card, USB, and other connectivity in a single chip. Furthermore, improved development efficiency through effective reuse of software assets developed for high-end equipment is increasingly important.

To respond to these needs, in 2008 Renesas developed the SH-NaviJ Series that, at the same time as taking advantage of the high-level map drawing functions and high quality of the Renesas SH-Navi Series*⁵ SoC products for high-end equipment, strictly selects only the functionality needed for low-end and middle-range dashboard-mounted car navigation system and implements these in a single chip. Renesas is now releasing the second-phase product in this series, the SH77722 (SH-NaviJ2), which increases both functionality and ease of use while supporting further miniaturization.

< Product Details >

The SH77722 incorporates the same SuperH*⁶ Family top-end SH-4A CPU core as used in existing SH-Navi Series products, and is provided in two versions, one with a 336 MHz, and one with a 400 MHz maximum operating frequency. The 400 MHz version achieves a CPU processing performance of 720 MIPS and an FPU (floating-point processing unit) performance of 2.8 GFLOPS (giga floating-point operations per second). These high levels of processing performance allow the implementation of high-performance systems. The instruction set is upward-compatible with that of the SH-4, allowing existing SH-4 system programs to be used and system development time to be shortened.

Like the SH77721 (SH-NaviJ1) phase-one product, the SH77722 includes a 2-D and 3-D graphics processor that provides high-level drawing functions. In addition to previous 2-D drawing functions such as bold-line drawing and anti-aliasing, it implements 3-D drawing functions such as triangle 3-D drawing and texture mapping, enabling high-quality drawing to be performed. Therefore the single drawing processor can handle drawing advanced map display composed of a wide variety of expressions of 3-D contents such as buildings and landmarks on map, and a richly expressive GUI display with heavy use of graphics functions, as well as 2-D contents like maps, icons, and menus. Renesas Technology also offers high-performance 2-D and 3-D graphics libraries that enable developers to extract maximum performance from the graphics processor. The 3-D graphics library features an industry standard interface and a user-friendly API (Application Programming Interface) that makes it easy to utilize the rendering functions supported by the graphics processor. Moreover the 2-D graphics library conforms to the GDI-Sub^{*7} specifications compliant with Microsoft's Windows^{®*8} Automotive^{*9} 5.0 Service Pack 2.

This product also implements a rich variety of peripheral functions necessary for car information systems, including the following, and can contribute to reducing system parts counts and reducing costs in high-performance systems.

- USB 2.0 High Speed host/function interface
- SD^{*10} card host interface
- FM multiplex decoder
- CAN and MOST in-vehicle LAN interfaces
- Multiple audio and multiple serial interfaces

In addition, the use of Unified Memory Architecture enables memory to be shared by the various modules, making it possible to reduce the number of external memory parts.

The external buses provided are a 32-bit dedicated bus enabling connection to high-speed DDR2-SDRAM and a 16-bit extension bus for connection to flash memory or SRAM.

An E10A-USB emulator connected to a host PC via a USB interface can be used as a development environment, and the provision of an on-chip debugging function allows real-time debugging to be carried out at the maximum operating frequency.

Renesas is now preparing a reference platform for user system development offering the following features to allow the user to carry out efficient system development. Renesas plans to provide this development system in July 2009.

- Includes car information system oriented peripheral circuits, providing a user system actual-device verification environment.
- Can be used as a software development tool for application software, etc.
- Allows easy addition of user's custom functions.

This development platform will support efficient user system development, including functional evaluation of the SH-NaviJ2 and application software development.

Renesas Technology will continue to contribute to advances in the car navigation market by developing SoC products offering higher CPU performance, speed, and functionality, including multi-core products, for high-end systems, as well as products with performance and functions specialized for low-end and middle-range systems, in order to meet evolving market needs in a timely manner.

< Notes >

Notes: 1. Source: Renesas Technology estimate based on figures from Strategic Analytics Inc.

2. Graphical user interface (GUI): A user interface in which the information is graphically displayed and can be operated intuitively by pointing devices and the like.
3. LVDS: Low-voltage differential signal. A technique in which digital data is transmitted with low-voltage amplitude. It is mainly used as a digital interface for display and communications equipment.
4. CAN is an abbreviation of "Controller Area Network," an automobile network specification proposed by Robert Bosch GmbH of Germany.
5. SH-Navi Series: SoCs for car information systems such as car navigation, using a Renesas Technology 32-bit RISC CPU core SuperH. Three products are currently in mass production, including the SH7774 featuring an on-chip image recognition engine. In addition, Renesas also released a dual-core SoC product.
6. SuperH™ is a trademark of Renesas Technology Corp.
7. GDI-Sub: Graphic framework of Windows Automotive unique offering compatibility between GDI and calling instruction.
8. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
9. Windows Automotive is an embedded operation system developed by Microsoft Corporation for car information terminals.
10. An SD card license must be obtained in order to use an SD card.

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

< Typical Applications >

- Car information terminals: Low-end to middle-range car navigation systems, etc.

< Prices in Japan > *For Reference

Product Name	Maximum operating frequency	Package	Sample Price [Tax Included] (Yen)
SH77722 (R8A77722DA01BGV)	336 MHz	449-pin BGA	5,000

< Specifications >

Item	SH77722 (SH-NaviJ2) Specifications	
Type name	R8A77722DA01BGV	R8A77722DA02BGV
Power supply voltage	1.15 to 1.3 V (internal), 3.3 V and 1.8 V (external)	1.2 to 1.35 V (internal), 3.3 V and 1.8 V (external)
Maximum operating frequency	336 MHz	400 MHz
Processing performance	600 MIPS, 2.3 GFLOPS	720 MIPS, 2.8 GFLOPS
CPU core	SH-4A core	
On-chip RAM	ILRAM: 16 Kbytes	
Cache memory	4-way set associative type with separate 32 Kbytes for instructions and 32 Kbytes for data	
External memory	DDR2-SDRAM (data transfer rate: 336 MHz) directly connectable to dedicated DDR2 bus	DDR2-SDRAM (data transfer rate: 266 MHz) directly connectable to dedicated DDR2 bus
	SRAM or ROM directly connected to extension bus	
Extension bus	Address space: 64 Mbytes × 3	
Main on-chip peripheral functions	Renesas Graphics processor (2-D/3-D) Display control: outputs for two screens (digital RGB and LVDS) Video input interface SD card host interface × 2 channels USB 2.0 host/function interface FM multiplex decoder Controller area network (RCAN) interface × 2 channels MOST interface module Various audio interfaces × 4 channels Dedicated DMAC × 26 channels I ² C bus interface × 2 channels Serial communication interface (SCIF) × 8 channels Remote control interface × 1 channel A/D converter (10-bit) × 4 channels Timer × 9 channels On-chip debugging function Interrupt controller (INTC) Clock pulse generator (CPG): built-in PLL frequency multiplier	
Power-down modes	Sleep mode Module standby mode DDR-SDRAM power supply backup mode	
Package	449-pin BGA (21 mm × 21 mm)	

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*** Information contained in this news release is current as of the date of the press announcement, but may be subject to change without prior notice. ***