Hitachi Releases SH7727 32-Bit RISC Microcomputer with On-Chip USB Host, plus USB Function and Color LCD Controller

— Ideal for multimedia products such as portable information terminals and multifunctional phones supporting internet application —

Tokyo, June 4, 2001— Hitachi, Ltd. (TSE: 6501) today announced the SH7727, with a 160 MHz/100 MHz operating frequency incorporating a USB (Universal Serial Bus) Host, together with a USB Function and color LCD controller, on a single chip. Sample shipments will begin in July 2001 in Japan.

This product incorporates a high-performance SuperH™*[1] RISC engine family 32-bit RISC microcomputer SH3-DSP CPU core, enabling high-speed voice and image middleware compression/decompression processing. It also provides a comprehensive range of peripheral functions, including a USB Host, USB Function, and color LCD controller, on a single chip, making it possible to design multimedia products such as portable information terminals and multifunctional phones supporting internet application that offer higher performance in a more compact size and at lower cost.

With the remarkable advances made in the multimedia field in recent years, the task of interfacing a PC to its peripherals has come to be handled by the USB interface, which allows high-speed transfer of large volumes of data, including voice and image, and many PCs now incorporate a USB Host. In line with this, more printers and other peripheral devices now include a USB Function--the facility that handles data exchange--and a built-in USB Function is also being increasingly found in multimedia products such as portable information terminals and digital still cameras. However, connecting a portable information terminal directly to a printer, for instance, requires one of the devices to be equipped with a USB Host, a requirement that has previously been met by means of a dedicated LSI. In developing multimedia products and peripheral devices with a built-in USB Host, therefore, there is a strong demand for a single-chip implementation that will allow both size and cost to be reduced. Meanwhile, digital information services, including internet e-mail and image display, are becoming more widely available for stationary consumer phones and fax machines. The trend is thus one of increasing devices for multimedia, including multifunctionality and color displays, and there is a demand for semiconductor devices that can provide these features by means of digital data processing.

The SH7727 now being released meets these needs by offering the following features.

(1) Incorporating USB Host and USB Function compliant with USB Standard Rev. 1.1 compliant
The USB Host supports isochronous, interrupt, control, and bulk transfer, allowing a maximum data transfer speed of 12 Mbps (bits per second), and also complies with OpenHCI (Open Host Controller Interface) specifications, facilitating porting of device driver software from PC driver software, for example. The USB Function supports interrupt, control, and bulk transfer, and also incorporates a transceiver that eliminates the need for external parts such as buffers.

(2) Incorporating color LCD controller
The color LCD controller supports STN, DSTN, and TFT liquid crystal panels. The memory for storing display image data employs a UMA (Unified Memory Access) architecture, and is shared with system memory. Display of up to 65,536 colors is possible with a 640 × 480-dot screen size, for example. A 2.4-Kbyte line memory buffer is also provided, enabling high-speed drawing of large volumes of data.

(3) Enabling high-speed processing by incorporating high-performance SH3-DSP 32-bit CPU core
High processing performance of 208 MIPS and 320 MOPS at 160MHz operating frequency enables high-speed voice and image middleware processing, including MP3[2], ADPCM[3], and JPEG[4], and also allows VoIP protocol processing used in internet telephone, and the like.

The SH7727 also incorporates a variety of peripheral functions. In addition to specialized functions such as an interface allowing connection to an AFE (Analog Front End) IC and an interface enabling direct connection to an Audio CODEC IC for music playback, the SH7727 offers a comprehensive set of on-chip peripheral functions that include an MMU (Memory Management Unit) and DMAC memory management function, A/D and D/A converters for analog signal processing, interfaces for various kinds of memory including synchronous DRAM, and an IrDA (Infrared Data Association) Ver.1.0, PCMCIA controller for infrared communication.

In addition, the provision of on-chip debugging functions (H-UDI and AUD)[5] allows real-time emulation at the maximum operating frequency using the E10A PC card emulator development tool.

Two kinds of package are supported: a 240-pin HQFP and 240-pin CSP.

Use of the SH7727 will simplify the development of products incorporating a USB interface, and also, thanks to its comprehensive set of peripheral functions, make it possible to reduce the number of external parts and create a high-performance system in a more compact size and at lower cost.

The SuperH family product lineup will be further enhanced in the future in response to market needs, and development will also continue on products offering higher performance together with lower power consumption.

Notes:1. SuperH is a trademark of Hitachi, Ltd.

2. MP3: MPEG-1 Audio Layer 3. MPEG is an abbreviation of Moving Picture Experts Group. MPEG is an international standard for compression/decompression of color moving pictures including audio, such as video. MP3 is a compression/decompression standard relating to MPEG audio.

3. ADPCM: Adaptive Differential Pulse Code Modulation, a typical audio data compression/decompression method using differentials.

4. JPEG: Joint Photographic Experts Group, an international standard for color still image compression/decompression.

5. On-chip debugging functions (Hitachi-User Debug Interface, Advanced User Debugger): Part of the debugging circuitry previously incorporated in an emulator. The inclusion of these functions enables real-time emulation at the actual microcomputer operating frequency during system evaluation, etc.

<Typical Applications>

Handheld PCs, LBPs, multifunctional printers

Storage devices, wireless LANs, network devices, products incorporating VoIP

Multifunctional phones, portable information terminals, video printers, digital still cameras,

digital video cameras

<Pricing in Japan> (For Reference)

Product Name		Operating Frequency	Package	Unit Price for 10,000-Unit Lot (Yen/pcs.)
SH7727	HD6417727F160	160MHz	HQFP-240	2,500
	HD6417727BP160V		CSP-240	2,700
	HD6417727F100	100MHz	HQFP-240	2,300
	HD6417727BP100V		CSP-240	2,500

< Specifications >

Item		SH7727 (160MHz) HD6417727F160 HD6417727BP160V	SH7727 (100MHz) HD6417727F100 HD6417727BP100V
Power supply voltage	Internal	1.75 V to 2.05 V	1.6 V to 2.05 V
	External	3.0 V to 3.6 V	2.6 V to 3.6 V
Operating frequency		160MHz	100MHz
Processing performance		208 MIPS / 320 MOPS	130 MIPS / 200 MOPS
CPU		SH3-DSP	
Cache memory configuration		16 Kbytes, mixed instructions/data, 4-way set-associative, write-through/write-back selectable, LRU algorithm	
X/Y memory (for DSP)		16 Kbytes	
Bus width		16 bits/32 bits selectable	
On-chip peripheral functions		• DMAC × 4 channels • MMU • USB Host, USB Function (USB Standard Rev. 1.1 compliant) • Timer × 3 channels • Real-time clock • A/D converter × 6 channels • D/A converter × 2 channels • Color LCD controller • PCMCIA controller • IrDA 1.0	
Interfaces		• Serial interface × 3 channels •AFE • Audio CODEC interface • Memory interfaces (SRAM/synchronous DRAM/burst ROM/PCMCIA), etc.	
Other		On-chip debugging functions (H-UDI, AUD)	
Packages		• HQFP-240 (0.5 mm pitch, 32 mm × 32 mm) • CSP-240 (0.65 mm pitch, 13 mm × 13 mm)	