**Description**

The SH7750 (SH-4 series) is a high performance, cost-effective, 2 issue superscalar RISC microprocessor for embedded applications. The SuperH™ architecture is the leader in code density among RISC microprocessors, reducing memory costs in embedded applications. It features a 64-bit external data bus, a 16-bit fixed-length instruction set and a 128-bit vector graphics engine.

The SH7750 is used in consumer, computing, multi-media, and communication markets. Applications include handheld PCs, sub-notebook PCs, Internet appliances, set top boxes, and game machines. The device can be paired with an ASSP companion device for a low cost, low IC count, and differentiated system.

Hitachi optimized the SH7750 MMU, cache size, and peripheral mix for Windows®CE applications.

**Features**

**General**
- 200 MHz/360 MIPS at 3.3V I/O, 1.8V internal
- 16 x 32-bit general purpose registers
- 256 pin LBGA

**CPU**
- Code compatible with SH7000/7600/7700 series
- 16 x 32-bit general purpose registers
- 32 x 32-bit single-precision floating point registers or 16 x 64-bit double-precision floating point registers or 4 x 128-bit single-precision vector registers and register matrix
- 16-bit fixed instruction length for high code density
- 32 x 32 + 64 --> 64 bits multiply-accumulate unit for special functions such as software modems
- MMU Designed for Windows®CE 1KB, 4KB, 64KB, and 1MB page sizes, 64-entry, fully associative UTLB
- 4 entry, fully associative µITLB
- 5 stage pipeline

**Memory**
- On-chip cache, 8KB instruction and 16KB data
- Write back or write through, selectable by page
- Low voltage cache to reduce power consumption
- On-chip bus state controller allows direct connection to DRAM, SDRAM, SRAM, ROM, and Flash ROM
- 8, 16, 32, or 64-bit data bus support

**Peripherals**
- DMA, 4 channels
- Timers, 3 channels x 32-bits
- Watchdog timer

---

**SH-4 Block Diagram**

<table>
<thead>
<tr>
<th>SH-4 CPU</th>
<th>Memory Management Unit</th>
<th>Specialized Math Circuits</th>
<th>Peripheral Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Two-way superscalar RISC</td>
<td>• Full Windows CE support</td>
<td>• 3D floating point acceleration hardware</td>
<td>• DMA controller</td>
</tr>
<tr>
<td>• 360 MIPS</td>
<td>• 1K/4K/64K/1MByte page sizes</td>
<td></td>
<td>• Programmable power management</td>
</tr>
<tr>
<td>• Upward compatible with SH-1/2/3</td>
<td>Unified TLB 64 entry</td>
<td></td>
<td>• Interrupt controller</td>
</tr>
<tr>
<td></td>
<td>Micro ITLB 4 entry</td>
<td></td>
<td>• Timers</td>
</tr>
<tr>
<td>Integer Unit</td>
<td>Data</td>
<td>Peripheral Functions</td>
<td>• Real-time clock</td>
</tr>
<tr>
<td>32-bit</td>
<td>16 KByte</td>
<td></td>
<td>• Serial interface</td>
</tr>
<tr>
<td>Floating Point Unit</td>
<td>WB/WT, selectable by page</td>
<td></td>
<td>• User break controller</td>
</tr>
<tr>
<td>64 bit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cache**
- Instruction 8 KByte
- Data 16 KByte

**Bus Unit**
- Glueless interface to SDRAM, EDO DRAM, fast page DRAM, SRAM, and ROM

**Data bus**
- 64/32/16/8 bits, 256-pin package
- Realtime clock
- PCMCIA control logic
- Serial communications interface, 1 channel (asynchronous/synchronous, with smart card interface)
- Serial communication interface 1 channel (asynchronous, with 16 byte transmit and receive FIFOs)
- PLL with x1/8, x1/6, x1/4, x1/2, x3/4, x1, x3/2, x2, x3, x6 external clock capability
- Interrupt controller

- General purpose I/O, 16 lines
- Dynamic power control
- Low power modes: sleep and standby
- Peripheral turn off capability
- User break controller for on-chip debugging

Support

- Hardware:
  - Hitachi E10 emulator
  - Hitachi D9000 development platform for SH7750 and Windows®CE
- Software:
  - Hitachi:
    • C, C++ compiler, assembler, simulator/debugger
  - Third parties:
    • C, C++ compiler, assembler, simulator/debugger, Cygnus Support (gnu), Green Hills Software, Microsoft® VC++ for Windows CE
- Operating Systems:
  Windows®CE, Hitachi OS, and others

Ordering Information

Part numbers:
SH7750-HD6417750BP200 (200 MHz, LBGA-256)

Complete SH-4 technical documentation is online at:
http://www.hitachi.com/semiconductor

This document may, wholly or partially, be subject to change without notice.

Contacts

Eastern
Hitachi Semiconductor (America) Inc.
25 Mall Road
Burlington, MA 01803
(617) 229-2150

Southwest
Hitachi Semiconductor (America) Inc.
2030 Main Street
Irving, CA 92714
(714) 553-8500

Mountain Pacific
Hitachi Semiconductor (America) Inc.
4600 S. Ulster Street
Suite 690
Denver, CO 80237
(303) 779-5535

Bloomington
Hitachi Semiconductor (America) Inc.
3800 W. 80th Street, Suite 1550
Bloomington, MN 55431
(612) 896-3444

Great Lakes
Hitachi Semiconductor (America) Inc.
Fairlane Plaza North, Suite 311
290 Town Center Drive
Dearborn, MI 48126
(313) 271-4410

North Central
Hitachi Semiconductor (America) Inc.
500 Park Boulevard
Suite 415
Iasca, IL 60143
(708) 773-4864

South Central
Hitachi Semiconductor (America) Inc.
One Westchase Center
10777 Westheimer Dr.
Suite 1040
Houston, TX 77042
(713) 974-0534

IBM Engineering
Hitachi Semiconductor (America) Inc.
6907 Capitol of Texas Hwy.
Suite 210
Austin, TX 78731
(512) 418-9360

Mid-Atlantic
Hitachi Semiconductor (America) Inc.
325 Columbia Turnpike
Suite 203
Florham Park, NJ 07932
(201) 514-2100

South Central
Hitachi Semiconductor (America) Inc.
5511 Capitol Center Dr.
Suite 204
Raleigh, NC 27606
(919) 233-0800

South Eastern/IBM Labs
Hitachi Semiconductor (America) Inc.
One Westchase Center
10777 Westheimer Dr.
Suite 1040
Houston, TX 77042
(713) 974-0534

IBM
Hitachi Semiconductor (America) Inc.
21 Old Main Street
Suite 206
Fishkill, NY 12524
(914) 897-3000

Ottawa
Hitachi (Canadian), Ltd.
320 March Road
Suite 602
Kanata, Ontario,
Canada K2K2E3
(613) 591-1990

Toronto
Hitachi (Canadian), Ltd.
6740 Campobello Road
Mississauga, Ontario
Canada L5N 2L8
(416) 826-4100

Calgary
Hitachi (Canadian), Ltd.
10655 Southport Road S.W.,
Suite 460
Calgary, Alberta
Canada T2V4Y1
(403) 278-1881

©1997 Hitachi Semiconductor (America) Inc.
Printed in U.S.A.
SuperH and Cool Engine are trademarks of Hitachi, Ltd.
Other trademarks are property of their respective holders.
1097/2500/CC/PP/KB
Order Number: PHW135F00621