HG73C Series

μCBIC - embedded H8/300H, H8S, SH-1, & SH-3
ASIC Product Brief

HITACHI

Description

The HG73C Series is a family of cell-based integrated circuits (CBICs) implemented in advanced 0.35-μm CMOS process technology featuring 3.3 V and 2.0 V core operation. Process-optimized libraries are available to support high-performance and low-power design requirements. Besides the low-voltage interface support for 3.3 V and 2.0V I/Os, the HG73C Series also provides support for standard 5V I/Os. Focusing on high density routing the HG73C can achieve a maximum of 3,000,000 useable gates. Three metal layers are standard with optional fourth and fifth layers available for clock, power, ground and signal distribution. Compilers for Single Port and Dual Port RAM, ROM, and Datapath provide necessary building blocks for ASIC designers, and a variety of analog modules including ADCs, DACs, video RAMDAC, and high frequency PLL allow designers to realize a single chip with both digital and analog functions.

The HG73C Series also includes HitachiÕs μCBIC solution, which is a CBIC with an embedded/controller core. The cores available are HitachiÕs 16-bit H8/300H, and H8S, and SuperH RISC engine cores including SH-1 controllers and SH-3 processors. Hitachi supports these cores with a comprehensive design and programming solution that includes the controller/processor core, simulation models, emulation support and software suite. The widely available emulators, compilers, and OS currently used for the the high volume standard controller and processor devices are fully compatible with the embedded cores. With processing performance ranging from several MIPS to 60 MIPS, Hitachi's μCBIC supports a broad range of application and system requirements with a highly integrated single chip solution.
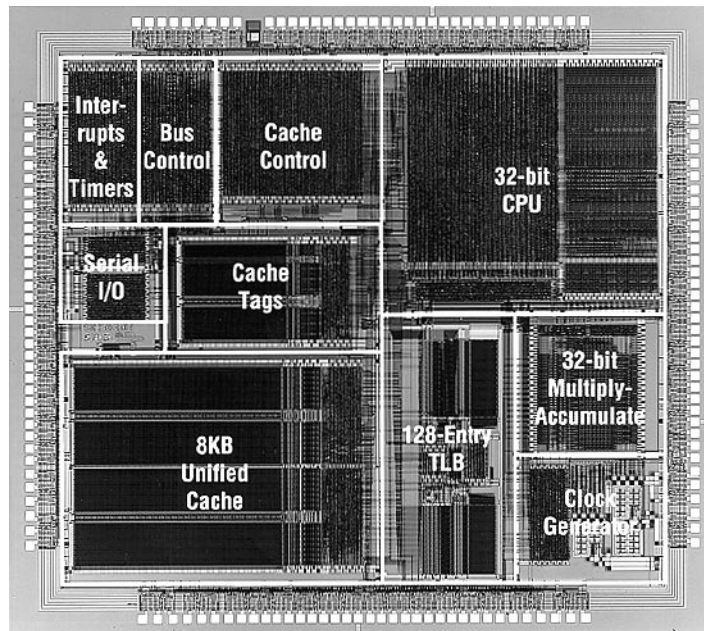
The design tools, based on popular, CAE tools, support a complete design environment capable of the seamless development of CBIC and μCBIC designs from logic simulation to final layout. Post-layout simulation takes full account of delay-driven components by factoring wiring RC parasitics and waveform ramp parameters into the simulation. The automated fault diagnostics and boundary scan design functions facilitate design-for-testability. Also, the application of automated clock-tree generation techniques greatly adds to the reduction of clock skew. The HG73C Series supports extensive libraries for core cells (internal cells) and I/O cells for the more popular CAE tools.

HG73C Series

Features

HG73C Series Cell-Based ICs for the Real System Solution

- Maximum Usable Gate Count:
  - 3,000,000 usable gates
- Raw Gate Density:
  - 18,600 gates/mm2
- Compileable Microcontroller cores:

  - H8/300H, H8S, and SuperH-1
- High Performance Microprocessor core:
  - SH-3
- Analog Modules:
  - ADCs, DACs, RAMDAC, and PLL
- Ultra-High-Speed Operation:
  - Supports maximum clock frequency in excess of 150 MHz

    | Internal Gates | 200 ps, Standard load, 2-input power NAND gate, Vcc = 3.3V |
    | Input Buffers | 300 ps, Standard load |
    | Output Buffers | 1300 ps, CL = 15 pF |

- Low Power Dissipation:
  - 0.23 µW/Gate ¥ MHz, Vcc=3.3V
- Process Technology:
  - 0.35µm CMOS, 3 to 5 layer metalization
    Process parameter-optimized with high-performance or low-power dissipation libraries

HITACHI

- Core Power:
  — 3.3V ± 0.3V, 2.0V ± 0.2V
- I/O Interface:
  — 5.0V ± 0.5V, 3.3V ± 0.3V, 2.0V ± 0.2V
- Versatile Compilers:
  — Single Port RAM, Dual Port RAM, ROM, and Datapath
- Abundant I/O Cell Libraries:
  — GTL, PECL, CMOS, TTL and PCI interface libraries.
- Design-for-Testability:
  — Hitachi's auto-diagnostic (shift-scan) functions facilitates automated test circuit insertion and auto-generation of high fault-coverage test vectors. Support is also available for JTAG boundary scan (IEEE 1149.1)
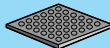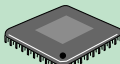
CBIC/μCBIC (μCBIC contains an embedded microprocessor)

Part No.	Feature Size	Leff	Core Power	I/O Power	Metal Layers	Max. Usable Gates	Max. Gate Density (Typical)	Processor Available
HG71C	0.8μm	0.7μm	3.3/5.0V	3.3/5.0V	2, 3	300K Gates	4.1K Gates (~2.2K Gates)	H8/300H
HG72C	0.6μm	0.55μm	3.3/5.0V	3.3/5.0V	2, 3	600K Gates	7.2K Gates (~4K Gates)	H8/300H, SH-1
HG73C	0.4μm	0.35μm	2.0/3.3V	2.0/3.3/5.0V	3, 4, 5	3M Gates	18.9K Gates (~10K Gates)	H8/300H, H8S SH-1, SH-3
HG74C	0.25μm	0.2μm	1.8/2.5V	1.8/2.5/3.3/5.0V	3, 4, 5	6M Gates	39.2K Gates (~20K Gates)	SH-4

Embedded DRAM

Part No.	Feature Size	L eff	Core Power	I/O Power	Metal Layers	Max. Usable Gates (w/out DRAM)	Max. Gate Density (Typical)	Max. DRAM (w/o gates)	DRAM Density (w/overhead)	Processor Available
HG73M	0.28μm	0.35μm	3.3/5.0V	3.3/5.0V	3, 4, 5	3M Gates	18.9K Gates (~10K Gates)	140Mbit	50KBytes/mm2	H8/300H, H8S, SH-1, SH-3

HG73C Series

Type	Item	Package Outline	Package Pin Count

Package Pin Count scale: 0, 100, 200, 300, 400, 600

Surface Mounting Type

- **QFP** — Quad Flat Plastic Package: 64 80 100 136 160 168 208 240 256 296 304 344 384
- **LQFP** — Low-Profile Quad Flat Package: 64 144 176
- **TQFP** — Thin Quad Flat Plastic Package: 80 100 120
- **HQFP** — Heatspreader-enhanced Quad Flat Package: 80 100 136 160 208
- **PLCC** — Plastic Leaded Chip Carrier: 44 68 84
- **BGA** — Ball Grid Array:
  - P-BGA: 256 352
  - S-BGA: 352 432 600
  - P-BGA: 352 480 672
- **CSP** — Chip Scale Packaging:
  - F I/O CSP: 112 144 160
  - F/O CSP: 184 216 264

Pin Insertion Type

- **PGA** — Ceramic Pin Grid Array: 135 179 240 257 299 401 600

LEGEND:
- ● In Mass Production
- ○ Under Development

Contacts

Sales & Marketing Headquarters
Hitachi Semiconductor (America) Inc.
2000 Sierra Point Parkway
Brisbane, CA 94005
Literature Requests:
1-800-285-1601
www.hitachi.com/semiconductor

Western
Hitachi Semiconductor (America) Inc.
1740 Technology Dr.
Suite 500
San Jose, CA 95110
(408) 451-9570

Central
Hitachi Semiconductor (America) Inc.
Two Lincoln Centre
5420 LBJ Freeway
Suite 1446
Dallas, TX 75240
(214) 991-4510

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

Southwest
Hitachi Semiconductor (America) Inc.
2030 Main Street
Suite 450
Irvine, 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
Itasca, 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

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

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

Southeast
Hitachi Semiconductor (America) Inc.
4901 N.W. 17th Way
Suite 302
Ft. Lauderdale, FL 33309
(305) 491-6154

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 T2W4Y1
(403) 278-1881

HITACHI