Intel® i960® Processors

i960® Architecture Family Product Highlights

- 32-bit register-based RISC core in all processors
- Code compatibility across entire product line
- Broad selection of price and performance levels
- Ideal for networking and imaging applications

i960® Processor Family Overview

Intel's i960® processors offer a broad line-up of code-compatible products for fast time-to-market. The product family consists of high-performance, 32-bit embedded RISC processors supported by an outstanding selection of development tools.

The i960 family can deliver this range of price and performance alternatives because it was designed for the extreme flexibility required by today's imaging, storage and networking applications. The i960® HA/HD/HT and i960® CA/CF processors are superscalar implementations and are able to execute multiple instructions per clock cycle. The i960® JT-100 Mini-PBGA package enables high densities ideal for space-constrained applications such as remote access, XDSL and hubs. The i960® KA/KB processors deliver high-performance with inexpensive DRAM memory subsystems. The i960® SA/SB processors are ideal for cost-sensitive designs.

The entire line is code-compatible offering a wide range of performance options, giving developers an easy migration path while preserving investments in existing hardware and software. It is a time-proven and excellent choice for local and wide-area networking, storage, telecom and imaging applications.

i960 Processor Family Features and Benefits

FEATURES	BENEFITS
32-bit register-based RISC architecture with 32 registers	**EFFICIENCY.** Provides speed and simplicity of design at a low cost
Enhanced CISC-like instruction set optimized for embedded applications	**SIMPLICITY.** Programming is easier; improves high code density and performance
Standard interrupt controller automatically resolves priorities; local registers automatically saved when subroutine is called	**RAPID RESPONSE.** Ideal for applications requiring fast response times
On-chip instruction caches standard on all processors	**SPEED.** Performance boosted by reducing external memory accesses to fetch instructions
On-chip data cache (Jx, Hx and CF processors)	**PERFORMANCE.** Reduces external memory accesses to fetch frequently accessed data
Unaligned big endian data access support (Cx, Jx and Hx processors)	**EFFICIENCY.** Handles variety of data formats quickly & efficiently, eliminating the need for exception handling routines
High-performance data buses offer transfer rates of up to 160 MB per second	**SPEED.** Supports demanding data-intense applications
Object-code compatibility across the family	**SELECTION.** Offers the ability to scale products across a wide range of price and performance levels while preserving existing software and minimizing development time
Software compatibility	**COMPATIBILITY.** Same instruction set from lowest to highest performance processor
Integrated 32-bit, 33 MHz PCI v2.1 compliant interface and Integrated memory controller (VH processor)	**INTEGRATION.** Increased throughput by having the processor, the PCI bus, and the memory controller on one chip resulting in cost, boardspace and power savings.

SUPERSCALAR PROCESSORS

Superscalar 32-bit RISC core processors, featuring De-Multiplexed bus.

i960® HA/HD/HT MICROPROCESSORS

- On chip high-speed interrupt controller
- Guarded memory unit
- Processor runs at 1x, 2x or 3x external clock speed
- Parity generation and checking

i960® CA/CF MICROPROCESSORS

- 4 Kbyte two-way set associative instruction cache (i960 CF processor only)
- 4 DMA channels and a flexible interrupt controller integrated on-chip
- Direct Memory Access

DEVICE	SPEED (MHZ)	3.3 VOLT OP.	TEMP.	DATA BUS WIDTH	INSTRUCTION CACHE	DATA CACHE	DATA RAM	TIMERS	PACKAGE
80960CA	33, 25, 16	No	C	32	1 Kbyte	No	1 Kbyte	No	A, KU
80960CF	40, 33, 25, 16	No	C	32	4 Kbytes	1 Kbyte	1 Kbyte	No	A, KU
80960HA	40, 33, 25	Yes	C	32	16 Kbytes	8 Kbytes	2 Kbytes	2 32-bit	A, FC
80960HD	80/40, 66/33 50/25, 33/16	Yes	C	32	16 Kbytes	8 Kbytes	2 Kbytes	2 32-bit	A, FC
80960HT	75/25, 60/20	Yes	C	32	16 Kbytes	8 Kbytes	2 Kbytes	2 32-bit	A, FC

Packages:
A = 168L PGA for i960 CA, CF, HA, HD and HT processors, and 40 MHz only in CF
FC = 208L SQFP (also known as PQ4) for i960 HA, HD, and HT processors
KU = 196L PQFP for i960 CA/CF processors, CA available in 16 and 25 MHz, CF available in 16, 25 and 33 MHz

Temperature Ranges:
C=Commercial (0 to 70 degrees C), except Jx processors C=Commercial (0 to 100 degrees C)
E=Extended (-40 degrees to 100 degrees C)

LOW POWER PROCESSORS

i960® JA/JD/JF/JC/JS/JT PROCESSORS

- Multiplexed bus
- Clock tripling technology
- Built-in interrupt controller
- 100 MIPS execution for the i960 JT-100 processors
- Large cache for faster performance
- State of the art testability

i960 VH PROCESSORS

- Integrated 32-bit, 33 MHz PCI v2.1 compliant interface
- Selectable core speeds (33 MHz, 66 MHz or 100 MHz)
- Integrated memory controller supporting DRAM, SRAM, ROM and flash memories
- 2 Channel DMA controller between the PCI bus and local memory bus
- I2C bus interface unit
- Messaging unit

DEVICE	SPEED (MHZ)	3.3 VOLT OP.	TEMP.	DATA BUS WIDTH	INSTRUCTION CACHE	DATA CACHE	DATA RAM	TIMERS	PACKAGE
JX Series									
80960JA	33, 25, 16	Yes	C, E	32	2 Kbytes	1 Kbyte	1 Kbyte	2 32-bit	A, NG, GD
80960JD	66/33, 50/25 40/20, 33/16	Yes	C	32	4 Kbytes	2 Kbytes	1 Kbyte	2 32-bit	A, NG, GD
80960JF	33, 25, 16	Yes	C	32	4 Kbytes	2 Kbytes	1 Kbyte	2 32-bit	A, NG, GD
JT Series									
80960JC	66/33, 50/25 40/20, 33/16	Yes	C, E	32	16 Kbytes	4 Kbytes	1 Kbyte	2 32-bit	NG, GD
80960JS	33, 25, 16	Yes	C, E	32	16 Kbytes	4 Kbytes	1 Kbyte	2 32-bit	NG, GD
80960JT	100/33	Yes	C, E	32	16 Kbytes	4 Kbytes	1 Kbyte	2 32-bit	NG, GD
VH Processor									
80960VH	100	Yes	C	32	16 Kbytes	4 Kbytes	1 Kbyte	2 32-bit	FW

Packages:
GD = 196 PBGA 15 millimeter for i960 JA/JS/JF/JC/JD/JT processors
A = 132 PGA for i960 JA, JF, JD processors
NG = 132L PQFP for i960 Jx processors
FW = 324L PBGA for i960 VH processor

Temperature Ranges:
C = Commercial (0 to 70 degrees C), except Jx processors C = Commercial (0 to 100 degrees C)
E = Extended (-40 degrees to 100 degrees C)

i960 Processor Linecards

VALUE PROCESSORS

i960® SA/SB, i960® KA/KB AND i960® MC PROCESSORS

- Multiple register sets with register scoreboarding
- Built-in interrupt controller
- Multiplexed bus
- Built-in IEEE 754 compatible floating point unit (i960 SB/KB processors only)
- 4 Gigabyte, linear address space (i960 KA/KB only)
- High-speed 16-bit burst data bus (i960 SA/SB processors only)

DEVICE	SPEED (MHZ)	3.3 VOLT OP.	TEMP.	DATA BUS WIDTH	INSTRUCTION CACHE	DATA CACHE	DATA RAM	TIMERS	PACKAGE
80960KA	25, 20, 16	No	C, E	32	512 Bytes	No	No	No	A, NG
80960KB	25, 20, 16	No	C, E	32	512 Bytes	No	No	No	A, NG
80960MC	25	No	C	32	512 Bytes	No	No	No	A
80960SA	20, 16, 10	No	C, E	16	512 Bytes	No	No	No	N, S
80960SB	16, 10	No	C, E	16	512 Bytes	No	No	No	N, S

Packages:
A = 132L PGA for i960 KA/KB processor, available in 16, 20 and 25 MHz, and for i960 MC processor in 25 MHz
NG = 132L PQFP for i960 KA/KB processor
N = 84L PLCC for i960 SA/SB processor
S = 80L QFP (EIAJ) for i960 SA available in 10, 16 and 20 MHz, SB available in 10 MHz

Temperature Ranges:
C=Commercial (0 to 70 degrees C), except Jx processors C=Commercial (0 to 100 degrees C)
E=Extended (-40 degrees to 100 degrees C)

i960 Processors Development Tools

Intel recognizes the importance of development tools and their contribution to getting your product to market quickly. Development support for the i960 architecture includes the i960 CTOOLS from Intel. CTOOLS offers a complete development environment for 32-bit RISC embedded processors, and incorporates common industry specifications for easy design migration. The tools include advanced optimizing, C/C++ compilers, assembler, linker, utilities, GUI-based debugger, and a variety of libraries including floating-point emulation. For complete information on CTOOLS, visit the Web site at developer.intel.com/design/i960/devtools.

The world class companies that we have brought together to support your i960 microprocessor development requirements are widely considered to be the leaders in their respective fields.

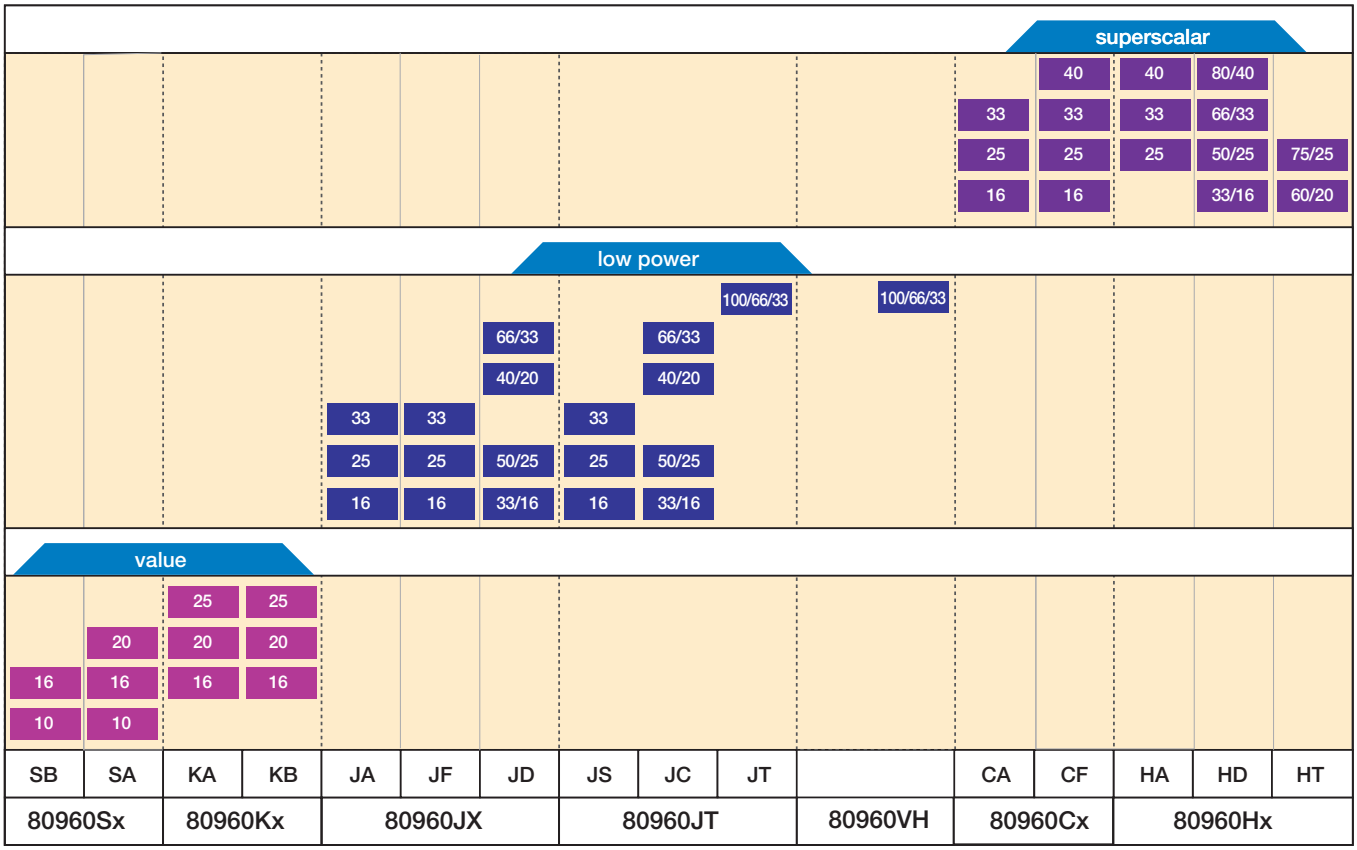
More than 40 vendors, offering 100+ development tools such as in-circuit emulators, compilers, operating systems, evaluation boards, assemblers, debuggers and more support the i960 processor family.

Vendors supporting i960 processor family include:

Accelerated Technology
Applied Micro Circuits
Applied Microsystems
Chronology Corporation
CompuLab
Corelis Incorporated
Emulation Technology
Galileo Technology
Green Hills Software Inc.
Harris & Jeffries
Hewlett-Packard
Integrated Systems Inc.
International Test Technologies
Irvine Compiler
JMI Software Systems
KADAK Products Ltd.
NSI Com
PLX Technology, Inc.
Real-Time Innovations
Sky Computers Inc.
Spectrum Digital
Synopsys Inc.
Tektronix Inc.
U S Software
V3 Semiconductor
Venture Technologies
Wind River Systems

You may visit our Electronic Tools Catalog at amber.intel.com/scripts-toolcat/index.asp and view their product offerings to find the right solution for your development needs.

Intel® i960® Processor Portfolio



Processors in MHz

Intel Access

Developer's Site	developer.intel.com
i960® Home Page	developer.intel.com/design/i960
Other Intel Support:	developer.intel.com/design/litcentr
Intel Literature Center	(800) 548-4725 7 a.m. to 7 p.m. CST (U.S. and Canada) International locations please contact your local sales office.
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