

T=49-17-32

CLIPPER

Availability: Now for 40- and 50-MHz C300 chipsets, modules, and C311 CPU/FPU. Now for the C4 CPU and FPU chipset, at 40- and 50-MHz.

Cost: All 1,000 qty: At 40 MHz, the C311 CPU/FPU costs \$160, the C300 chipset costs \$336, and the module costs \$536. At 50 MHz, the C3 CPU/FPU costs \$191, the C300 chipset costs \$495, and the module costs \$695. At 40 MHz, the C4 CPU and FPU chipset costs \$795. At 50 MHz the C4 CPU and FPU chipset costs \$895.

Description: The CMOS RISC-based C411 CLIPPER CPU uses superscalar instruction issue and superpipelining to speed execution. Binary compatibility is maintained between the CLIPPER C400 and C300. The C421 is the floating coprocessor for the C411 CPU.

32-BIT CMOS

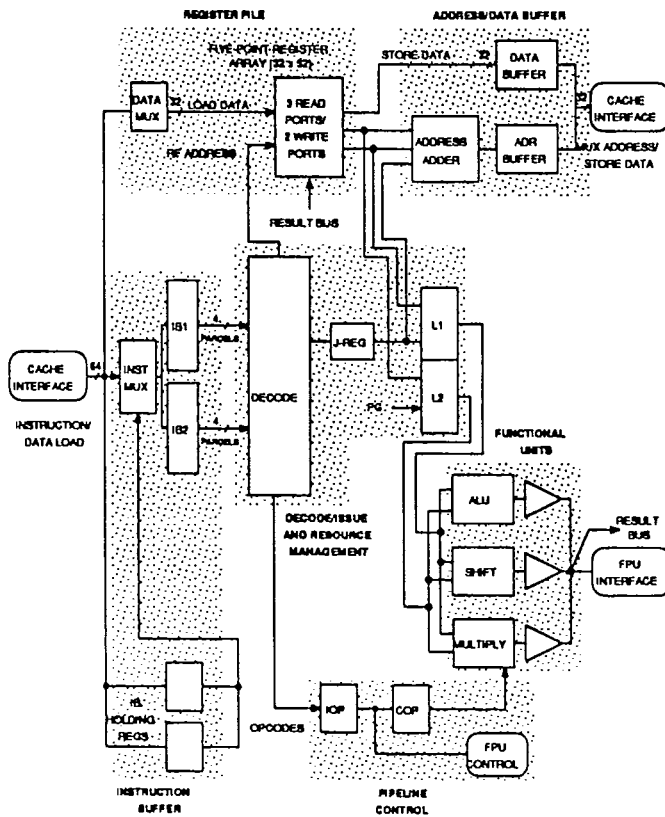
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 For more information, Circle No.

Status: The company has shipped over 70,000 CLIPPER modules through July 1991, giving CLIPPER a large installed base. Intergraph accounts for most of the CLIPPER sales.

HARDWARE

CHARACTERISTICS

SOFTWARE



Hardware notes:

1. The C411 CPU features separate ALU, barrel shifter, and multiplier operating in parallel.
2. The C411 has two high-speed buses: a 64-bit, 800-MByte/sec input bus, and a 32-bit multiplexed address/output-data bus using advanced differential drivers that support fast low-voltage swings.
3. Improved input bus architecture alternates data fetch with instruction fetch on every half clock cycle.

I DATA-MANIPULATION INSTRUCTIONS

Add, subtract, multiply, divide (32- and 64-bit IEEE floating-point operations done in floating-point coprocessor), floating-point converts, negate, compare, logicals (including AND, OR, EXCL OR, and NOT), 32- and 64-bit shifts and rotates, including floating point.

II DATA-MOVEMENT INSTRUCTIONS

Architecture favors register-to-register operations and avoids operations on memory other than register-to-memory movements. Nine addressing modes, including absolute, relative (with/without displacement), relative indexed, and PC (program-counter) indexed.

III PROGRAM-MANIPULATION INSTR

Push, pop, supervisor, and user stacks (any register can be used as pointer).

IV PROGRAM-STATUS-MANIP INSTR

Two status words, a user-program status word, and a privileged system status word, which can only be written in supervisory mode.

V SPECIAL INSTRUCTIONS

Supervisory mode commands. Hardware supports 256 vectored interrupts with 16 priority levels, 57 traps, and 128 supervisory calls. Software semaphores are supported for multitasking.

Specification summary: For optimum performance, the C411 utilizes a large external cache to supply instructions and data on every clock cycle at 50 MHz. The processor uses separate 64-bit input and 32-bit output buses to support the CPU's data and instruction bandwidth requirements. Fast IEEE 754 floating-point operations are executed by the C421 coprocessor also running at 50 MHz. The C411 CPU can be purchased individually or as a pair with the C421 FPU coprocessor. Both are available in 299-pin PGA packages. Future versions of the C400 family are planned to operate at speeds greatly in excess of 50 MHz.

Software notes:

1. The C300's 164 instructions are a balance between 1-cycle-RISC and multicycle-CISC commands. Hardwired architecture in the C400 allows most instructions to execute in one clock cycle. C400 superscalar operations issue multiple instructions on each clock cycle.
2. The C411 CPU and C421 FPU instructions are compatible with the C300.
3. The C421 is compatible with the IEEE 754 floating-point standard.

HARDWARE

SUPPORT

SOFTWARE

The C300 CLIPPER module integrates three chips into a 32-bit Compute Engine. Because of the higher throughput rates, the C400 uses a discrete cache and MMU. Intergraph offers CLIPPER development systems that provide 8 MBytes of RAM, 156 MBytes of hard-disk storage, and an Ethernet interface. Software includes CLIX (which is based on UNIX System V), a C compiler, a loader/debugger, and utilities.

Intergraph offers a set of optimizing compilers for C and FORTRAN, and a performance-tuned operating system kernel for the CLIPPER C411/C421. More than 750 third-party packages are available, including compilers for LISP, Ada, and other languages; tools and utilities; end-user application packages in the areas of Mechanical/Manufacturing, Architecture/Facility Management, Electronic Design, Utilities and Public Works, Mapping/GIS, Publishing, and more.