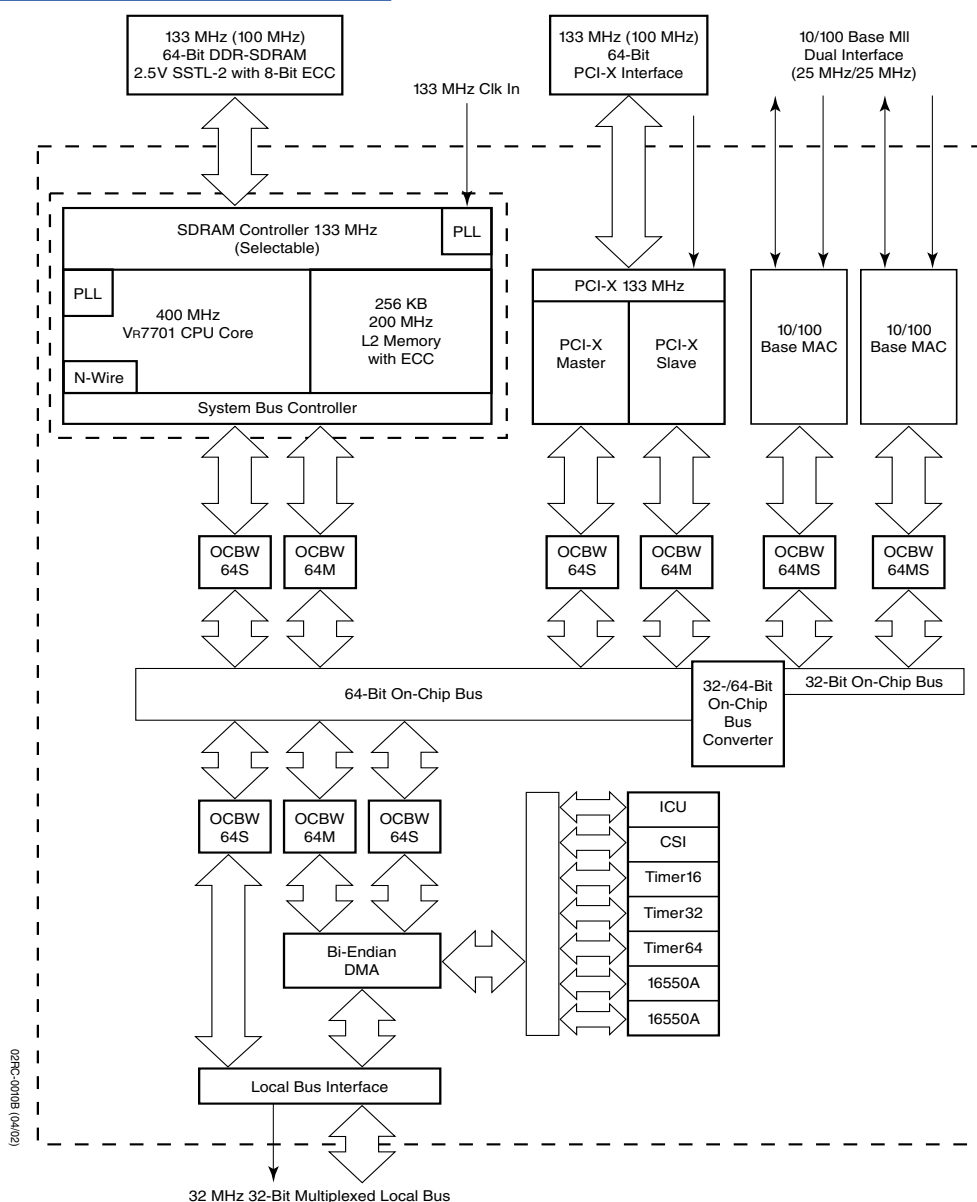


Description

The 64-bit VR7701™ (μPD30771) MIPS® microprocessor is particularly suited for designs requiring a high-performance embedded system processor. Features include a 133 MHz double data rate (DDR) SDRAM controller, 133 MHz PCI-X interface, an on-chip L2 cache, two 10/100 Base Ethernet media access controllers (MACs), and a variety of other peripherals. The execution pipeline selects two of 16 fetched instructions in out-of-order manner and dispatches them to the appropriate integer unit, floating-point unit, branch prediction unit, or load/store unit.

Block Diagram



CPU Core

- 64-bit RISC VR5500 CPU core
- MIPS64-compatible instruction set
- Ten-stage superscalar pipeline with out-of-order execution
- 400 MHz pipeline clock
- 48 double-entry translation lookaside buffer (TLB)
- 36-bit physical and 40-bit virtual address space
- Floating-point unit (FPU)
- Primary cache memory
 - 32 Kb instruction and 32 Kb data
 - Two-way set associative
 - Line locking
- N-wire on-chip debugging interface
- Phase-locked loops with multiple clock modes supplied by internal clock derived from external source

On Chip Secondary Cache (L2) Memory

- 256 Kb; 4-way set associative
- Cache line locking
- Secondary cache operating frequency 200 MHz
- Error detection and correction protection

DRAM Controller

- 64-bit data bus with or without SEC/DED ECC
- 100 MHz or 133 MHz SDR/DDR memory
- Maximum 1 Gb x 8-, x16-, x32-bit width DRAM
- Maximum 4 Gb memory space divided into as many as 4 banks
- SSTL_2, LVTTTL level interface

PCI-X Interface

- Configurable for PCI-X at 133 MHz, 100 MHz, 66 MHz or PCI: 33 MHz
- 64-bit PCI-X rev.1.0; 64-bit PCI rev 2.2
- Host bridge allowing bidirectional control
- Asynchronous operation with CPU clock

Process

- 0.13 µm, 6AL process

Local Bus Interface

- 32-bit address/data 33 MHz multiplexed bus
- Configurable 8-, 16-, 32-bit bus sizing
- 128 MB address space
- Bi-endian
- Five chip select pins
- Four-channel DMA
- LVTTTL interface

Ethernet MAC Interface

- 10/100 Base MAC with Media Independent Interface (MII)
- Two channels

Serial Interface

- Two-channel 16550-compatible UART controller
- One-channel synchronous interface (CSI) master mode

Other Peripherals

- Six-channel 16-bit interval timer
- Two-channel 32-bit interval timer
- One-channel 64-bit interval timer
- Eight-channel external interrupt input
- 16-level interrupt controller
- JTAG interface for NEC N-wire debugging (in-circuit emulator)

Operating Temperature

- Tc (case temperature) = 0°C – 85°C

Supply voltage

- Core: 1.5 V
- DRAM I/O: 2.5V
- Other I/O: 3.3V
- Low-power standby mode

Package

- 500-pin PBGA package (40 mm x 40 mm)

The information in this document is current as of April 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information. No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document. NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others. Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information. While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features. NEC semiconductor products are classified into the following three quality grades: "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application. "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots. "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support). "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc. The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application. V6 Series, V64100, V64121, V64122, V64181, V64171A, V64172, V64173, V64300, V64305, V64310, V64372, V64373, V64375, V65000, V65000A, V65074, V65077, V65432, V65476, V610000, V612000, and V612000A are trademarks of NEC Corporation in the United States and other countries. MIPS is a registered trademark of MIPS Technology, Inc. Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries. Linux is a registered trademark of Linus Torvalds. PC Card is a trademark of the Personal Computer Memory Card International Association. UNIX is a registered trademark of The Open Group in the United States and other countries.

(Note) (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
(2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

To find out more about the products and services available from NEC Electronics,
call 1-800-366-9782, fax 1-800-729-9288,
or visit our web site at www.necel.com