National Semiconductor

HPC16164/26164/36164/46164
HPC16104/26104/36104/46104
HPC16064/26064/36064/46064
HPC16004/26004/36004/46004
High-Performance microControllers with A/D

General Description

The HPC16164, HPC16104, HPC16064 and HPC16004 are members of the HPC™ family of High Performance micro-Controllers. Each member of the family has the same core CPU with a unique memory and I/O configuration to suit specific applications. The HPC16164 and HPC16104 have 16k bytes of on-chip ROM. The HPC16104 and HPC16104 have no on-chip ROM and is intended for use with external memory. Each part is fabricated in National's advanced microCMOS technology. This process combined with an advanced architecture provides fast, flexible I/O control, efficient data manipulation, and high speed computation.

The HPC devices are complete microcomputers on a single chip. All system timing, internal logic, ROM, RAM, and I/O are provided on the chip to produce a cost effective solution for high performance applications. On-chip functions such as UART, up to eight 16-bit timers with 4 input capture registers, vectored interrupts, WATCHDOG logic and MICRO-WIRE/PLUS™ provide a high level of system integration. The ability to address up to 64k bytes of external memory enables the HPC to be used in powerful applications typically performed by microprocessors and expensive peripheral chips. The term "HPC16164" is used throughout this data-sheet to refer to the HPC16164, HPC16104, HPC16064 and HPC16004 devices unless otherwise specified.

The HPC16164 and HPC16104 have, as an on-board peripheral, an 8-channel 8-bit Analog-to-Digital Converter. This A/D converter can operate in single-ended mode where the analog input voltage is applied across one of the eight input channels (D0–D7) a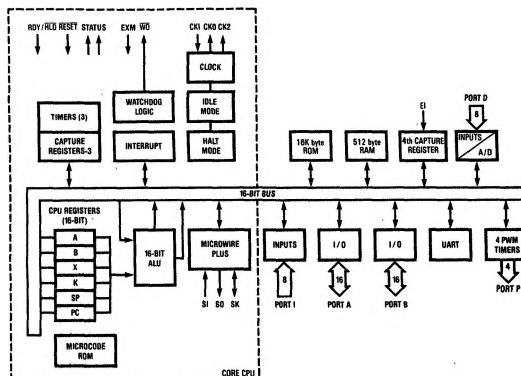nd AGND. The A/D converter can also operate in differential mode where the analog input voltage is applied across two adjacent input channels. The A/D converter will convert up to eight channels in single-ended mode and up to four channel pairs in differential mode. The HPC16064 and HPC16004 do not have onboard A/D.

The microCMOS process results in very low current drain and enables the user to select the optimum speed/power product for his system. The IDLE and HALT modes provide further current savings. The HPC is available in 68-pin PLCC, LCC, LDCC, PGA and 84-pin TapePak® packages.

Features

■ HPC family—core features:
  — 16-bit architecture, both byte and word
  — 16-bit data bus, ALU, and registers
  — 64k bytes of external direct memory addressing
  — FAST—200 ns for fastest instruction when using 20.0 MHz clock
  — High code efficiency—most instructions are single byte
  — 16 x 16 multiply and 32 x 16 divide
  — Eight vectored interrupt sources
  — Four 16-bit timer/counters with 4 synchronous outputs and WATCHDOG logic
  — MICROWIRE/PLUS serial I/O interface
  — CMOS—very low power with two power save modes: IDLE and HALT
■ A/D—8-channel 8-bit analog-to-digital converter with conversion time minimum 6.6 μs for single conversion
■ A/D—supports conversions in "quiet mode"

Block Diagram (HPC16164 with 16k ROM shown)

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