



Product Bulletin

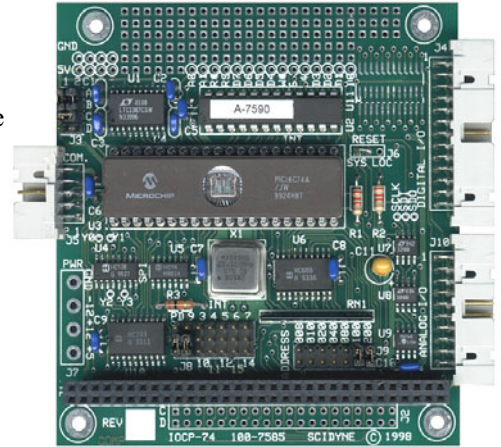
PC/104 Input/Output Coprocessor Module

PB7585

IOCP-74

FEATURES

- Highly integrated programmable I/O coprocessing module
- 20mhz PIC16C74 RISC microcontroller operates independently from host
- Eight digital Input/Output channels have I/O rack compatible pinout and drive
- Five analog input channels; two 12-bit and three 8-bit
- Two 12-bit analog output channels
- One module supervised RS-232/RS-485 serial communications port
- Host interrupts fully support sharing and access to all IRQs
- 2k of non-volatile EEPROM
- Prototyping area includes PC/104 buffered data, address, control and SPI bus
- Occupies only eight bytes of host I/O address space
- Easily programmed using common PIC languages (Assembler, BASIC or C)
- Module works with DOS or Windows® applications
- PIC16C74 microcontroller features:
 - ▶ 5 MIP operation (200ns instruction cycle typ.)
 - ▶ Internal EPROM and RAM
 - ▶ Timer functions: PWM, Count, Capture, Compare
 - ▶ Multichannel 8-bit analog-to-digital conversion
 - ▶ Digital inputs provide change of state detection
 - ▶ Watch-Dog Timer, Brown-Out Detection



APPLICATIONS

- Industrial automation and process control
- Scientific Apparatus and Instrumentation
- Robotics
- Communications protocol engine
- Module level Programmable Logic Controller
- Intelligent “Virtual-Peripheral” PC/104 modules

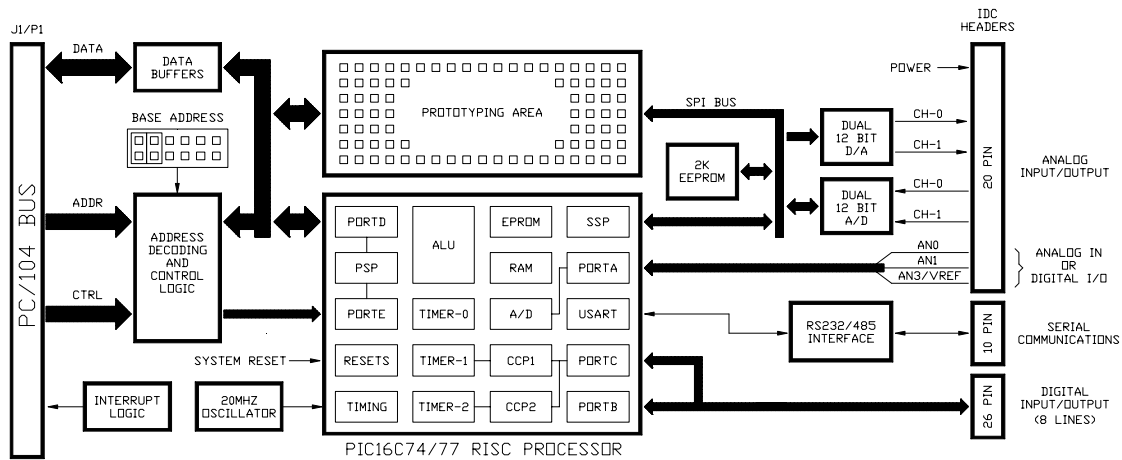
PRODUCT DESCRIPTION

The IOCP-74 is a high performance, user configurable, I/O processing sub-system for PC/104 bus computers. Designed to relieve the host from performing rudimentary I/O operations, it also provides a fast front-end response demanded by many real-time systems. A Microchip® PIC16C74 RISC processor controls on-board circuitry and executes any application specific computations or logic operations. The IOCP-74 consolidates the most requested peripherals into one module. Standard functions include: Analog and Digital I/O, Counter/Timers, EEPROM and Serial Communications. A user can easily connect additional hardware by means of the prototyping area which accommodates both parallel and SPI type devices. All module data variables and parameters are stored in a RAM array which the host accesses through a simple 8-bit sequential FIFO interface. This circuitry allows the exchange of relatively large blocks of data while occupying only eight host I/O locations. Further efficiencies are gained by using the module’s software generated shared interrupt to request host service only when anticipated events occur. The module comes pre-programmed and ready to use with a factory default functionality. The source code is supplied and fully illustrates the operation of the IOCP-74. Since most routines have already been developed, custom designs can be created quickly and with a higher degree of integrity by means of the proven software. To customize the module, a user simply merges the supplied PIC assembly language source code with any special software routines representing the specific application. The resulting code is then compiled and programmed into the microcontroller creating the final design. Development effort and costs are greatly reduced by taking advantage of the vast amount of supplemental software, application information and third-party tools available for this very popular family of microcontrollers.

BENEFITS

Most embedded applications not only require the measurement and control of real-world data but also that the data be conditioned, scaled or logically acted upon in some way before it can be applied to any practical purpose. Typical data acquisition and interface modules perform only “straight-through” conversions relying on the host to execute all intermediate operations. The entire process is easily compromised if the operations occupy a significant portion of time or if the host must also tend to other high overhead tasks. The IOCP-74 minimizes these conditions by placing a dedicated processor in between the host and the real-world data. Because the module is self-sufficient and user programmable, it provides an inherent buffer from measurement and control demands while also performing many application specific operations without any host intervention. The full array of on-board peripherals, the ability to include additional hardware and its programmable nature makes the IOCP-74 an ideal choice for many PC/104 based embedded applications.

Simplified Block Diagram



SPECIFICATIONS

I/O Peripherals:

Analog: Inputs: LTC1298, Two single-ended or one differential 12-bit (1 in 4096), ± 1 LSB, 0-5vdc, 11kHz max. PIC A/D, Three single-ended 8-bit (1 in 256), ± 1 LSB, Int./Ext. V_{REF} , 5vdc max. These three inputs can alternately be used as general purpose digital I/O.

Outputs: LTC1446, Two 12-bit (1 in 4096) ± 0.2 LSB, 0-4.095vdc, ± 5 mA

Digital: Eight digital I/O channels, CMOS levels, ± 25 mA. Pinout and drive compatible with I/O racks and other peripheral devices. Six "PORTB" bits provide software programmable pull-ups and change of state detection. Two "PORTC" bits provide alternate timer functions including Pulse-Width-Modulation, timer clock source and input/output capture/compare modes.

Memory: High speed non-volatile SPI EEPROM, 2k x 8-bit

Communications: PIC supervised serial asynchronous/synchronous communications. Software configured parameters. Supports 9-bit protocols and half/full duplex. Jumper selectable RS-232 or multi-drop RS-485

Addressing: Occupies 8 consecutive bytes in hosts I/O map. Jumper selectable between 0 through $0x3f8_{16}$

Interrupt: Software generated, supports sharing. Jumper selectable IRQ 3, 4, 5, 6, 7, 9, (10, 11, 12, 14 or 15)*

Processor: Socketed PIC16C74 (supports derivatives such as PIC16C77), 40 Pin DIP, 4K EPROM, 198 bytes RAM On-board 20mhz clock oscillator. Refer to Microchip[®] PIC16C74 data sheet for complete device information.

Prototyping area: 120+ solder-pad/wire-wrap holes, 0.036" dia., 0.1" spacing. One 24 SOIC pattern with wire access to pads. Access to: Logic power; PC/104 buffered D<0-7>, A<0-1>, IOR*, IOW*, Resets and 2 decoded I/O selects; Serial Peripheral Interface bus (SDI, SDO, SCLK) and 4 decoded SPI selects.

Power requirement: +5vdc $\pm 5\%$ @ 125mA typical. Unloaded outputs, user circuitry exempt.

Dimensions: PC/104 compliant, 3.55"W x 3.75"L x 0.6"H. 8-bit stack through. Holes for optional J2/P2 connector.

Environmental: Operating temperature: 0°C to 65°C Non-condensing relative humidity: 5% to 95%

Ordering Information: 100-7585, IOCP-74, PIC16C74 based PC/104 I/O coprocessor module
104-0002, Optional 20 position J2/P2 stack-through connector. * Required for upper IRQs
108-0048, PIC16C74A/JW, Windowed EPROM microcontroller

