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Find the *WinSystems PPM-TX* at our website: ***Click HERE***

WinSystems®
PC/104-Plus MODULE

PPM-TX
Pentium SBC
with 10/100 Ethernet

FEATURES

- 166 or 266 MHz Intel Pentium MMX CPU
- PC/104-*Plus*-compliant board
- 32 to 256MB of system SDRAM supported in a 144-pin SODIMM socket
- Socket for bootable DiskOnChip® or BIOS extension EPROM
- PC-compatible; uses Intel 430TX chip set
- 10/100 Mbps Ethernet using Intel 82551ER
- 4 RS232 serial ports with 16 byte FIFOs
- Bi-directional LPT port supports EPP/ECP
- USB supported
- Ultra DMA/33 EIDE hard drive supported
- Floppy disk controller supports 1 or 2 drives
- PC/104 and PC/104-*Plus* expansion connectors
- AT keyboard controller and PS/2 mouse support
- Activity LEDs onboard
- Two interrupt controllers and 7 DMA channels
- Three 16-bit counter timers
- Extended operating temperature available for 166 MHz board from -40°C to +85°C
- +5 volt only operation
- Upgrade for WinSystems' PPM-520
- Real Time Clock, WDT and power fail reset
- Small size: 3.6" x 3.8" (90mm x 96mm)

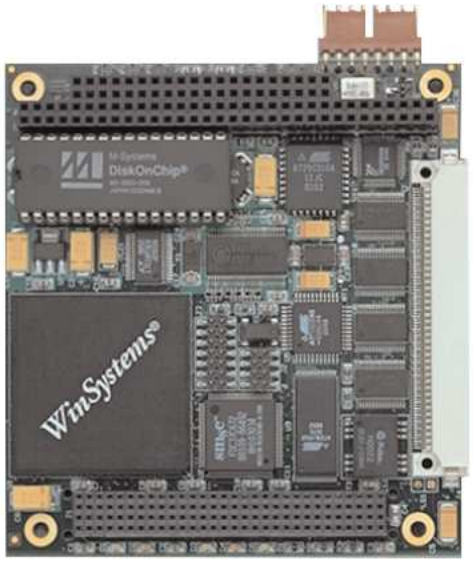
The PPM-TX is a feature-rich, Pentium® MMX-based single board computer (SBC) for networked industrial applications. The powerful CPU provides engineers with a high-performance, low-power and PC-compatible engine in a small size for deeply embedded applications.

It is configured with either a 166 or 266 MHz CPU with 10/100 Ethernet networking capability, four serial channels, and standard AT peripheral feature set. The board measures only 3.6 x 3.8-inches (90 x 96 mm) and is PC/104-compliant. It supports expansion with the PC/104 and PC/104-*Plus* connectors plus USB support.

The 166 MHz board does not require a fan and will operate over an extended temperature range that makes it ideal for rugged applications requiring an embedded PC. Its PC software compatibility assures easy program development, and checkout.

FUNCTIONAL CAPABILITY

Processor - An Intel 166 or 266 MHz "Tillamook" low power Pentium with MMX™ technology is soldered directly to the board. The MMX technology enables increased performance for communications applications.



It is binary compatible with the 8088/86, 80286, 80386DX/SX and 80486DX2/DX4 processors.

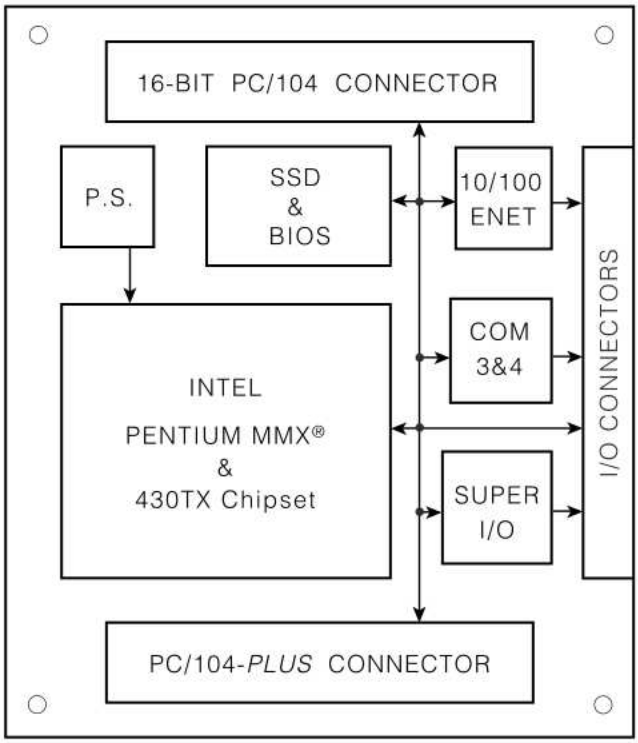
The data bus is 64-bits wide to improve the data transfer rate. Burst read and burst writeback cycles are supported in the processor along with bus cycle pipelining. This allows two bus cycles to be in progress simultaneously.

The pipelined floating point unit is up to 10 times faster than the one in the Intel486 for common operations including add, multiply, and load.

The 166 MHz Pentium is packaged in a 352 pin HL-PBGA that allows the board to operate without a fan and as well as at extended temperatures.

System Controller - An Intel 430TX PCIset is the system controller for this SBC. It consists of the 82439TX System Controller (MTXC) and the 82371AB PCI-ISA-IDE Xcelerator (PIIX4). The MTXC provides an integrated solution for the system controller and data path components for a Pentium processor system. It has the 64-bit Host and SDRAM Bus interface, 32-bit/33 MHz PCI Bus interface, and the PCI arbiter. The MTXC works with the PIIX4 to provide the PCI-to-ISA/IDE bridge functions along with other features such as a fast IDE interface (PIO mode 4 and Ultra DMA/33), Plug-n-Play port, and USB controller functions. It also provides the core logic that makes the board PC/AT software compatible including integrated peripheral controllers (two 82C37 DMAs, 82C54 timer, two 82C59 PICs, RTC, and CMOS memory) and the ISA bus for PC/104 expansion.

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PPM-TX BLOCK DIAGRAM

Cache - The Pentium® processor includes separate code and data caches integrated on-chip to meet performance goals. Each cache has a 32-byte line size and is 4-way associative. The caches can be enabled or disabled.

Memory - Up to 256 Mbytes of Synchronous Dynamic RAM (SDRAM) can be installed on the board by using a 144-pin SODIMM. A PC-66 or PC-100 compatible part (non-registered, unbuffered) with gold plated fingers is the recommended SDRAM. They are available directly from WinSystems. The board is shipped from the factory with no memory installed. This permits the user to either install and/or upgrade the memory capacity in the field.

BIOS - An industry-standard, Award BIOS is on the board to provide configuration flexibility, performance and AT-compatibility. It is set with a factory default that can be modified by the user. The BIOS is located in an EEPROM that can be modified without removing the storage device from the board. It will support diskless, keyboardless, and videoless operation as well as BIOS shadowing.

Also BIOS extensions can be programmed into another EPROM for remote boot from the Ethernet, video extensions, etc. This socket is shared with the SSD.

Direct Memory Access (DMA) - Seven DMA channels are supported with Channel 2 dedicated to the floppy disk controller. The LPT is plug and play configurable. The other DMA channels are wired to the PC/104 connectors.

Interrupts - Two 82C59A compatible interrupt controllers accept inputs from the onboard peripherals and the PC/104 and PC/104-*Plus* Bus connectors.

Floppy Disk Support - Up to two 3.5" or 5.25" drives from 360KB through 1.44MB formats are supported by the floppy disk controller. Two drives can be daisy chained on a single cable.

UDMA/33 EIDE Hard Disk Interface - The PPM-TX incorporates a PCI EIDE local bus interface for independent timing of up to 2 drives. PIO Mode 4 and Bus Master IDE transfers of up to 14 Mbytes/sec are supported. Also, it supports Ultra DMA/33 synchronous DMA mode transfers up to 33 Mbytes/sec. An LED blinks automatically while data is transferred to provide visual status information.

Solid State Disk (SSD) Support - A 32-pin, machine-tooled socket is provided to accept an M-Systems' DiskOnChip® (DOC). The DOC offers from 16MB to 1GB storage capacities in a single device. It includes an internal flash file system that provides hard disk read/write compatibility, automatic bad block management, and wear-leveling. A designer can use an onboard semiconductor device for applications where the environment is too harsh for mechanical hard disks or floppy disk drives while offering significant speed advantages.

Ethernet Controller - An Intel 82551ER is the 32-bit PCI Ethernet controller chip used for high-speed data transfer. It has auto negotiation capability for speed, duplex, and flow control. It supports IEEE 802.3 10-BaseT and 100BaseT in either full- or half-duplex mode at both 10 and 100 Mbps. In full-duplex mode, it adheres to the IEEE 802.x Flow Control Specification.

Two large 3Kbyte transmit and receive FIFOs help prevent data underruns and overruns. It has fast back-to-back transmission support with minimum interframe spacing. It also has improved dynamic transmit chaining with multiple priorities transmit queues. There are three LEDs on the board that provide status information. The red LED indicates 100BaseT, the yellow indicates Link, and the green is the Rx/Tx packet data.

The 82551ER chip is very popular both in the commercial and industrial PC-compatible market. This means that most PC-compatible drivers, utilities and 10/100 Ethernet supported operating systems will work directly with the PPM-TX. The configuration information describing the device's architecture, address, interrupt, etc. is stored in a serial EEPROM.

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USB - The Universal Serial Bus (USB) offers users connectivity with peripheral devices. The USB port supports transfers at either 1.5 or 12 Mbits/sec.

Serial Communications - Four independent, full-duplex, RS-232 serial asynchronous channels are onboard. All serial channels are configured as Data Terminal Equipment (DTE). Both the send and receive registers of each channel has a 16-byte FIFO. This device is a dual 16C550 compatible UART that offers software compatibility with PC-type driver programs.

Independent control of transmit, receive, line status and data set interrupts are on all channels. Each channel is setup to provide internal diagnostics such as loopback and echo mode on the data stream. An independent on-chip software programmable baud rate generator is selectable from 50 through 115.2 kbits/sec. Individual modem handshake control signals are supported for all channels.

RS-232 interface levels are supported on all channels. The RS-232 drivers have an on-chip charge pump to generate the plus and minus voltages so that the PPM-TX only requires +5 volts to operate.

Line Printer Port - The PPM-TX has a parallel port that may be operated in standard (SPP) bi-directional as well as Extended Capabilities Port (ECP - IEEE-1284) and Enhanced Parallel Port (EPP) modes. The output drivers can support 14mA per line.

The printer port can also be used as two additional general-purpose I/O ports if a printer is not required. The first port can be configured as 8 input or output only lines. The other port configured as 5 input and 3 output lines.

Keyboard/Mouse Controller - An 80C42-type controller supports a PC/AT-compatible keyboard. Additionally, a standard PS/2 mouse is supported by the PPM-TX.

I/O Access - Connector space is limited on the PPM-TX because of its high I/O content. The USB is wired to a 10-pin header on 0.100" centers. Two, 80-pin, 2mm connectors access the disk controllers, serial channels, LPT port, mouse, keyboard, Ethernet, reset and LED signals. WinSystems offers two optional cables that breakout the signals into individual connectors for each I/O function.

CBL-251-1 is a 1 foot long, multi-I/O cable for COM1 through COM4, LPT1, push button reset, PS/2 mouse, Ethernet, and keyboard controllers. COM1, COM2, COM3, and COM2 are 9-pin male "D" with strain relief. LPT1 is a 25-pin "D" female socket with strain relief. A standard 6-pin mini-DIN female PS/2 connector is for the keyboard. A mouse plugs into a 6-position PS/2 socket. Reset is a simple 2-wire push button. The 10/100 Ethernet is terminated in a RJ-45 female socket

CBL-252-1 is a 1-foot long multi-drive cable for the floppy disk drives and IDE hard disk drives plus USB. The floppy disk portion is terminated in a 34-pin socket on 0.100" centers that can plugged directly into a drive. The IDE cable is terminated into a 40-pin socket on 0.100" centers that can be plugged directly into a drive.

Status LED - A green status LED is also available to monitor system activity. Under a user's program control, it can indicate error conditions or blink different patterns to provide a visual indication of system status.

Real Time Clock - An MC146818A-compatible clock supports a number of features including periodic and alarm interrupt capabilities. In addition to the time and date keeping functions, the system configuration is kept in CMOS RAM contained within the clock section.

Watchdog Timer - A software/hardware enabled, retriggerable watchdog timer is provided. This timer must be updated at least once every 1.5 seconds otherwise a failure is assumed and the board will be reset. This circuit is important for use in remote and unattended applications.

Timers - Three, independent 82C54 compatible 16-bit timers are supported.

Power - Power is supplied via a 8-pin Molex connector. Both ±12 volts are wired directly to the PC/104 connector and not used by the PPM-TX.

Reset - A precision voltage monitors the +5 volt status. Upon detection of an out-of-tolerance condition, the board is reset. This action is critically important in order to detect brownout or power fail conditions. The reset circuit also ensures that the power is nominal before executing a power-on reset.

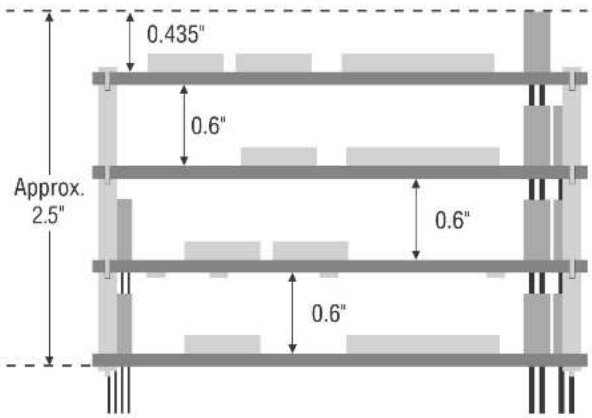
Battery - A 350 mAH battery supplies the PPM-TX board with standby power for the real time clock and CMOS setup RAM. A power supervisory circuit senses the off-board voltage and automatically switches to internal power when it drops below normal.

PC/104 Expansion - The PPM-TX has both a 16-bit PC/104 and a 32-bit PC/104-*Plus*, stackthrough or non-

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stackthrough, connector. PC/104 is the ISA bus and PC/104-*Plus* is the PCI bus for I/O functions requiring higher data transfer speeds.

The PPM-TX provides a common computer core from which engineers can add off-the-shelf or user-designed, application-specific PC/104 modules. PC/104 modules are self-stacking and plug together in a "piggy back" configuration to serve as a mezzanine expansion bus. PC/104 modules are very compact, measuring only 3.6 x 3.8 inches, and are offered by WinSystems and a number of third party companies worldwide. Module functions include specialty serial I/O, digital I/O, networking, GPS, modem, audio, SCSI, etc.



PC/104-Plus Module Stack

SOFTWARE SUPPORT

Software - The PPM-TX is designed to run both 16-bit and 32-bit x86-instruction set software. It is compatible with Microsoft's Windows® operating systems, such as WindowsCE, Windows98, WindowsNT, and Windows NTE as well as the applications that run on them. It also supports Linux and other PC-compatible x86 operating systems such as QNX and VxWorks.. It will also run other real-time executives that require a "PC-AT" hardware environment.

Software Developers Kit - WinSystems offers the system developers kits to provide the necessary hardware, software and cables to begin program development with the PPM-TX board. System developers kits are available for ROM-DOS, Sockets, Linux, Windows XPe, and Windows CE. Please contact your application engineer for details of the different kits.

SPECIFICATIONS

Electrical

PPM-TX CPU Clock:	166 or 266 MHz Pentium® MMX
PC/104 Interface:	16-bit stackthrough or non-stackthrough
PC/104-*Plus* Interface:	32-bit PCI stackthrough or non-stackthrough
Serial Interface:	4 Serial channels with RS-232 levels
LPT Interface:	Bidirectional LPT with ECP/EPP
UDMA/33 EIDE interface:	Supports 2 drives
Floppy Disk Interface:	BIOS supports one or two 360K/720K/1.2M/1.44M drives

Vcc = +5V ± 5% at 1.5A typ: PPM-TX-166-32M
Vcc = +5V ± 5% at 1.9A typ: PPM-TX-266-32M

System Memory

Addressing:	Up to 256 Megabytes
Capacity:	144-pin SODIMM; SDRAM supplied and installed by the user

Solid State Disk

Capacity:	One 32-pin memory socket supports up to a 1GB DiskOnChip®

Mechanical

Dimensions:	3.6" x 3.8" (90mm x 96mm)
Jumpers:	0.020" square posts on 2mm centers

Connectors

Serial, Parallel, Mouse, Keyboard, and Reset:	80-pin, 2 mm
Floppy , IDE, & USB:	80-pin, 2 mm
PC/104 Bus:	64-pin, 0.100" 40-pin, 0.100"
PC/104-*Plus*:	120-pin (4 x 30, 2 mm)
Power:	8-pin in-line Molex

Environmental

Operating Temperature (with no fan):

PPM-TX-166	-40°C to +85°C
PPM-TX-266	-40°C to +60°C

Non-condensing relative humidity: 5% to 95%

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ORDERING INFORMATION

PPM-TX-166-0	166 MHz Intel Pentium SBC
PPM-TX-166-0-ST	Stackthrough configuration
PPM-TX-266-0	266 MHz Intel Pentium SBC
PPM-TX-266-0-ST	Stackthrough configuration
SDK2-PPM-302-D	Software Developers Kit
FLASH-MD2200-Dxx	DiskOnChip®; where xx = storage capacities from 16MB to 1GB
SODIMM144-xxM	144-pin SDRAM where xx = 64, 128, or 256MB
ADP-USB	USB adapter
CBL-174-1	18 inch, 8-wire power cable
CBL-251-1	1 foot, Multi-I/O cable
CBL-252-1	1 foot, Multi-disk cable
CBL-SET-302-1	Cable set includes CBL-174-1, CBL-251-1,CBL-252-1, and ADP-USB
PS-80W-1	80 Watt power supply

WinSystems reserves the right to make changes to products and/or documentation without further notification.

WinSystems, Inc.

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