

FEATURES

- AMD SC520 CPU operating at 133 MHz
- PC-AT software compatible
- PC/104-compliant form factor: 3.6 x 3.8 inches
- Up to 256 Mbytes of SDRAM using SODIMM
- Solid state disk socket that supports an onboard bootable 32-pin DIP M-Systems' Flash SSD
- Industry standard Phoenix BIOS
- Intel 82551ER 10/100 ENET controller
- 4 COM RS-232 ports and supports RS-422/485 on COM 3 and 4
- Bi-directional LPT port
- Onboard IDE hard disk interface
- Onboard floppy disk controller
- x86 compatible interrupt and DMA controllers
- Three 16-bit counter/timers
- AT keyboard controller
- PS/2 mouse port
- 16-bit PC/104 expansion connector
- 32-bit PC/104-Plus expansion connector
- Watchdog timer and power fail reset
- Real-time clock with battery backup
- Status, hard disk and Ethernet activity LEDs
- Only +5 volts required
- Low power, less than 4.5 Watts

The PPM-520 is a highly integrated, PC-compatible, single board computer for thin-client and other network-enabled applications. Because of its small size, it is also suited for portable and mobile products. It is a combination of 3 PC/104 modules: (PCM-586, PPM-10/100, and PCM-DSPIO) on a single card.

It is powered by a 5x86 operating at 133 MHz. A 10/100 Ethernet controller provides high-speed Ethernet access in addition to four RS-232 COM ports. Up to 256MB of memory can be installed in a SODIMM socket. Also, a DiskOnChip® can be installed on board for up to 288MB of solid state flash storage.

WinSystems' PPM-520 provides PC-AT power, performance and compatibility for space- and budget-limited industrial applications. The board will support DOS, Linux and Windows operating systems. Even though the board is PC-AT compatible, it will operate without disks, keyboard or a monitor.

FUNCTIONAL CAPABILITY

Processor - This board is based upon a 133 MHz SC520. The AMD SC520 is an integrated 32-bit microcontroller with PC/AT-compatible peripherals, PCI-host bridge and synchronous DRAM controller.



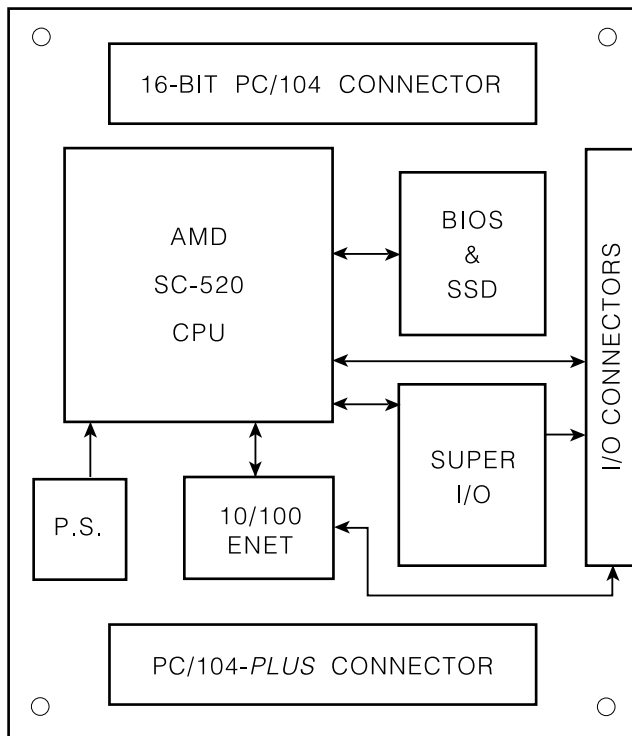
The CPU portion is the AMD 5x86 CPU with floating point unit (ANSI/IEEE 754 standard), and 16-Kbyte write-back cache. It also integrates standard PC/AT-compatible peripherals including two serial COM channels, the programmable interval timer, real-time clock, DMA controller, and interrupt controllers. It is based upon 0.25-micron process technology allows for low power consumption in a small BGA package.

The AMD SC520 supports the industry-standard x86 microprocessor instruction set. This software compatibility allows the use of different operating systems, real-time executives, development tools, and applications programs that directly support the x86 architecture. This improves time-to-market and allows easy software migration to the board.

This PPM-520 supports the revision 2.2 version of the 32-bit PCI bus at a speed of 33 MHz. This is used both for onboard peripherals and the PC/104-Plus bus.

Memory - The board supports 32-, 64-, 128-, or 256-Mbytes of Synchronous Dynamic RAM (SDRAM) that is 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. Memory is available from Crucial Technologies or directly from WinSystems.

The board is shipped from the factory with no memory installed. That permits the user to either install or upgrade the memory capacity in the field.



PPM-520 BLOCK DIAGRAM

BIOS - A Phoenix BIOS is supplied that provides configuration flexibility, performance and AT-compatibility. It supports both 720KB and 1.44MB 3.5 inch and 360KB and 1.2MB 5.25 inch floppy disk drives, AT-compatible keyboards, and other standard BIOS features.

Solid State Disk (SSD) Support - A JEDEC standard 32-pin, machine-tooled socket is provided to accept an M-Systems' DiskOnChip® (DOC). The DOC offers from 16 Mbytes to 1 Gbyte 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.

Rotational Disk Support - Up to two, 3.5" or 5.25" floppy disk drives are supported. Also an industry-standard 16-bit IDE interface is provided to support up to 2 hard disks. A status LED provides visual status during IDE data transfers.

Direct Memory Access (DMA) - DMA is supported. 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 Bus connectors.

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 light emitting diodes (LEDs) on the PPM-10/100 to provide a visual indication of the link status, network activity and network speed. The yellow Link Integrity LED is lit when there is a valid connection detected. The green Activity LED blinks on and off when activity is detected on the wire. The red LED is on if a 100BASE-T link is detected and off if a 10BASE-T link is detected.

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-520. The configuration information describing the device's architecture, address, interrupt, etc. is stored in a serial EEPROM.

Serial Communications - Four independent, full-duplex, 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 four channels. The RS-232 drivers have an on-chip charge pump to generate the plus and minus voltages, COM 3 and 4 also support RX-422/485.

Line Printer Port - The port is relocateable to 480 different address. It is a multi-mode parallel printer port that supports the PS/2 standard bi-directional parallel port (SPP), Enhanced Parallel Port (EPP), or Extended Capabilities Port (ECP). The output drivers support 14 mA per line.

Keyboard and Mouse Controller - An integrated 80C42 equivalent keyboard controller supports a PC/AT-type keyboard. Additionally, a PS/2-compatible mouse is supported on the PPM-520.

I/O Access - Connector space is limited on the PPM-520 because of its high I/O content. Two, 80-pin, 2mm connectors access the disk controllers, serial channels, line printer, 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 COM4 are 9-pin male "D" with strain relief. LPT1 is a 25-pin "D" female socket with strain relief. The keyboard is a standard 6-pin mini-DIN female PS/2 connector. The mouse is a 6-position PS/2 mouse socket. Reset is a simple 2-wire push button. The Ethernet is 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. The floppy disk portion is terminated in a 34-pin socket on 0.100" centers that can be 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.

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

Real-Time Clock/Calendar - A real-time clock is used as the AT-compatible clock/calendar. It 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.

Reset - A precision voltage comparator monitors the +5 volt status. Upon detection of an out-of-tolerance con-

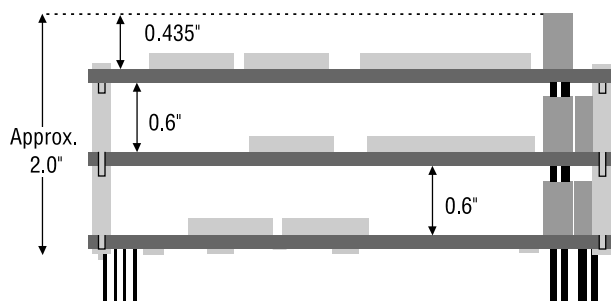
dition, the board is reset. This action is critically important in order to detect brown-out or power fail conditions. The reset circuit also ensures that the power is nominal before executing a power-on reset.

Battery Back-up - A 170-mAH battery supplies the PPM-520 board with standby power for the real-time clock and CMOS set-up RAM.

A power supervisory circuit contains the voltage sensing circuit and an internal power switch to route the battery or stand-by voltage to the circuits selected for backup. The battery automatically switches ON when the Vcc of the systems drops below the battery voltage and back OFF again when Vcc returns to normal.

Speaker - An speaker is onboard for sound generation. A beep code is generated that corresponds to any BIOS error codes.

PC/104 Expansion - The PPM-520 has both a 16-bit PC/104 and a 32-bit PC/104-Plus stackthrough or non-stackthrough bus connector. A "-ST" suffix identifies a board with a stackthrough connector installed.



PC/104-Plus Module Stack

Power - Power is brought into the board through an 8-pin connector. Both ± 12 volts are wired directly to the PC/104 connector and is not used by the PPM-520.

SOFTWARE SUPPORT

The PPM-520 is designed to be PC-AT software compatible. This means that it will work with a host of operating systems software, executives, development tools and utilities to quickly create software for embedded systems. It works with ROM-DOS, MS-DOS, Linux, and Windows 3.1/95/98/CE as well as other popular real-time operating systems such as QNX, and VxWorks that require a "PC/AT" hardware environment.

A Phoenix BIOS provides configuration flexibility, performance and AT-compatibility. It supports both 720KB and 1.44MB 3.5 inch and 360KB and 1.2MB 5.25 inch

floppy disk drives, AT-compatible keyboards, and other standard BIOS features.

Software Developers Kit (SDK) - WinSystems offers the SDK2-PPM-301-D software developers kit to supply the necessary hardware, software and cables to begin program development with the PPM-520 board. It consists of ROM-DOS 7, disk and I/O cables, a 2GB or larger hard disk, CD-ROM, a 1.44MB high density 3.5 inch floppy disk, speaker/amplifier and triple output power supply housed in a black anodized enclosure.



SDK2 Software Developers Kit

ROM-DOS Developers Kit (RDK) - WinSystems also offers several different Flash-based developers kits for those applications that do not need rotational media during development. When you order a PPM-520 along with the RDK of your choice, WinSystems will jumper the CPU, program and install the Flash part to your PPM-520. The RDK includes a PS-50W-1, PCM-POST, Flash memory, ROM-DOS 7, cables and utility software.

SPECIFICATIONS

Electrical

PPM-520 CPU Clock:	133 MHz
PC/104 Interface:	16-bit stackthrough or non-stackthrough
PC/104-Plus Interface:	32-bit stackthrough or non-stackthrough
Serial Interface:	4 serial channels with RS-232 levels; COM 3 and 4 with RS-422/485
Ethernet	10/100 Fast Ethernet

LPT Interface:	Bidirectional Centronics
IDE Interface:	16-bit, supports 2 drives
Floppy Disk Interface:	Supports either one or two 360K/720K/1.2M/1.44M
Vcc=+5V +5% @ 900mA	typ: PPM-520-133 with 32MB

System Memory

Addressing:	256 Megabytes
Capacity:	32, 64, 128, or 256MB of SODIMM SDRAM

Solid State Disk

Capacity:	One 32-pin socket supports 16MB to 1GB DiskOnChip®
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Mechanical

Dimensions:	3.6" x 3.8" (90mm x 96mm)
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Connectors

Serial, Parallel, Mouse, Keyboard, and Reset	80-pin, 2 mm.
Floppy and IDE:	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:	-40°C to +85°C
Non-condensing relative humidity:	5% to 95%

ORDERING INFORMATION

PPM-520-133-0M	PC/104-Plus 586-133 module with 10/100 ENET
PPM-520-133-0M-ST	Stackthrough configuration
SDK2-PPM-301-D	Software Developers Kit
FLASH-MD2200-Dxx	DiskOnChip®; where xx = 16MB to 1GB capacities
SODIMM144-xxS	144-pin SDRAM where xx = 64, 128, or 256MB
CBL-174-1	18", 8-wire power cable
CBL-251-1	1 foot, Multi-I/O cable
CBL-252-1	1 foot, Multi-disk cable
CBL-SET-301-1	Cable set for the PPM-520, includes, CBL-174-1, CBL-251-1, and CBL-252-1

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