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Find the *WinSystems PCM-SX-2787C* at our website: *Click HERE*

WinSystems®
PC/104 MODULE

PCM-SX 386SX Single Board Computer

FEATURES

- 33 MHz 386SX PC/104 single board computer
- Low power and low cost
- PC-AT software compatible
- Up to 8Mbytes of surface mounted DRAM
- Solid state disk socket supports onboard bootable 32-pin DIP Flash, SRAM or (EP)ROM
- Up to 288MB Flash Disk with flash file system
- Industry standard BIOS with POST
- 16-bit PC/104 bus expansion connector
- Two serial ports with FIFOs: COM1 and COM2 with RS-232, optional RS-422/485 for both channels
- Bidirectional LPT port that supports EPP/ECP
- Watchdog timer and power fail reset
- 16-bit IDE interface & floppy controller
- Two interrupt controllers and 7 DMA channels
- Three 16-bit counter/timers
- AT keyboard controller
- Real-time clock with battery backup
- Status and hard disk activity LEDs
- Speaker port with onboard piezo transducer
- Small size: 3.6 x 3.8 inches (90mm x 96mm)
- +5 volt only operation
- Operating temperature: -40°C to +85°C

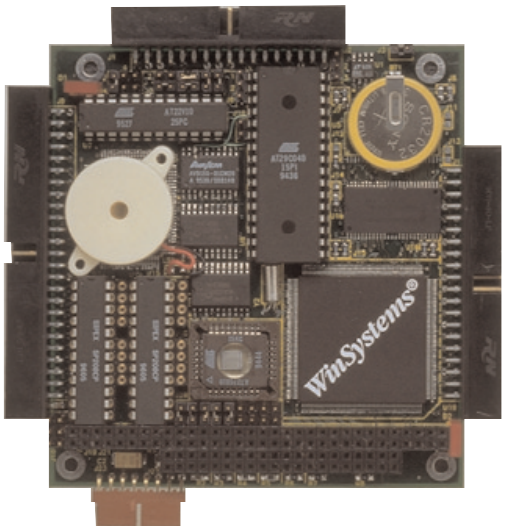
WinSystems' PCM-SX is a compact, 386SX compatible, single board computer (SBC) for embedded designers. It is an ideal solution where PC-AT power, performance and compatibility are needed in space- and budget-limited industrial applications.

Even though the board is PC-AT compatible, it will operate without disks, keyboard or a monitor. The PCM-SX is well suited for portable and mobile products because of its compact size, processing performance, +5 volt only operation and low power requirements.

The PCM-SX can operate as a standalone SBC or expanded with PC/104 modules to meet the system hardware configuration requirements.

FUNCTIONAL CAPABILITY

Processor - The PCM-SX module operates at 33 MHz. The processor and core logic chip set are integrated into a highly efficient single device that includes the DRAM controller, bus interface and integrated peripheral controller. The AT peripherals include two 8237 DMAs, 8254 timer, two 82C59 interrupt controllers, keyboard controller, real time clock and CMOS memory.



Memory - Up to 8Mbytes of surface mounted dynamic RAM is populated on the board. These parts are soldered directly into the board to improve reliability for applications subject to shock and vibration.

The PCM-SX is shipped from the factory with an industry standard BIOS installed in a 128KB EPROM. At reset, the BIOS is shadowed into the DRAM so that it will execute faster.

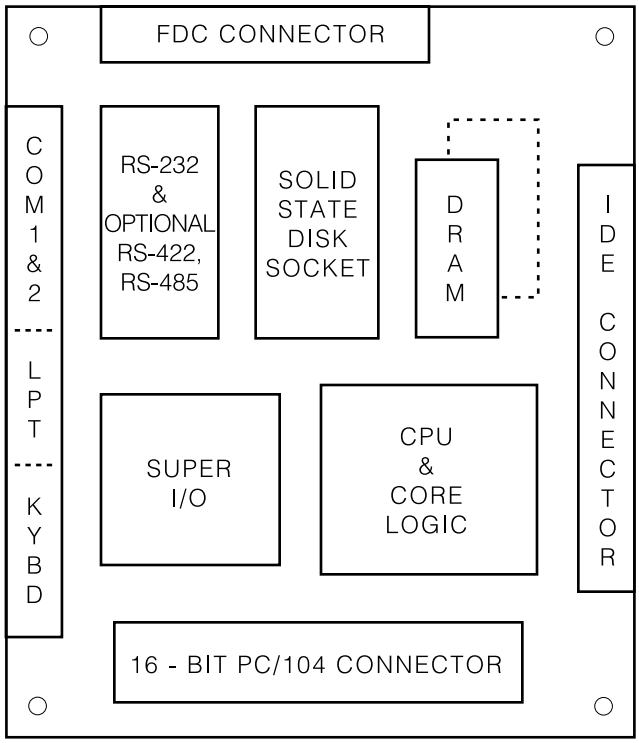
Solid State Disks (SSD) - A user can substitute on-board semiconductor devices for applications where the environment is too harsh for mechanical hard disks or floppy disk drives while offering significant speed advantages.

One 32-pin socket supports a SRAM, EPROM, PEROM or DiskOnChip®. Device sizes are 512K x 8 for the SRAM, EPROM and PEROM. Also, a 1M x 8 EPROM can be used in the socket.

Flash Disk - A 32-pin DiskOnChip® Flask disk is supported but not populated. It is a 32-pin device that offers 8 to 288Mbyte capacity and includes TrueFFS,® an embedded flash file system. The file system provides hard disk read/write compatibility, automatic bad block management and wear leveling.

ROMDISK - A diskette imaging program called MKDISK is provided to simplify the creation of a bootable ROMDISK made from a floppy diskette. Since the bootable ROMDISK is an exact image of a bootable floppy diskette, all testing and debugging can be accom-

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PCM-SX BLOCK DIAGRAM

plished by using a floppy drive. Once the application is ready for ROM, it is a simple matter to use the MKDISK utility to create the EPROMs necessary for a bootable ROMDISK equivalent of the functioning floppy.

RAMDISK - A RAMDISK is available as a bootable device using the BIOS extension or as a non-bootable disk by using an installable device driver. By using the standard MS-DOS Format program, a bootable RAMDISK can be created in a floppy disk size of up to 512KB. Either a 512KB SRAM or Atmel PEROM (Flash) device is supported.

WinSystems provides an installable device driver called USSD.SYS for use with MS-DOS and ROM-DOS operating systems. It supports disk sizes up to 1MB onboard and up to 16MB off board when using the PCM-SSD PC/104 modules. The driver supports both PEROMs (Atmel +5 Flash) and battery backed SRAMs in the socket.

Direct Memory Access (DMA) - Seven DMA channels are supported. Channel 2 is dedicated to the floppy disk controller, and the other channels are wired to the PC/104 connector.

16-Bit IDE Hard Disk Interface - A 40-pin header connector handles all command, data and status I/O lines to an industry standard IDE interface. A status LED provides a visual status during data transfers.

3.5" and 5.25" Floppy Disk Support - Up to 2 floppy disk drives are supported by the on-board controller which provides access via a standard 34-pin connector.

Serial Communications - Two independent, double-buffered, full-duplex, asynchronous serial channels with FIFOs are supported. This device is a dual 16550 that offers software compatibility with PC-type driver programs. They are mapped at COM1 and COM2 (3F8-3FF and 2F8-2FF hex) respectively. Independent control of transmit, receive, line status and data set interrupts are on both channels. Each channel is setup to provide internal diagnostics such as loopback and echo mode on the data stream. The unit contains two independent on-chip software programmable baud rate generators selectable from 50 through 115.2Kbits per second. Individual modem handshake control signals are supported for both channels.

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

CBL-247-1 COM1 & COM2 RS-232 Pin-Out

Pin	Flow	Signal
1	IN	Data Carrier Detect (DCD)
2	IN	Receive Data (RxD)
3	OUT	Transmit Data (TxD)
4	OUT	Data Terminal Ready (DTR)
5	—	Signal Ground (GND)
6	IN	Data Set Ready (DSR)
7	OUT	Request To Send (RTS)
8	IN	Clear To Send (CTS)
9	IN	Ring Indicator (RI)

Optionally, both RS-422 or RS-485 electrical levels can be supported on both COM1 and COM2 by removing the RS-232 transceivers and installing the optional CK-75176 chip kit. The RS-422/485 configuration provides separate balanced transmit and receive signal pairs. For RS-485 multi drop lines, one signal pair can be used for "party line" network structures.

Both serial channels are configured as Data Terminal Equipment (DTE) and wired to a 50-pin connector at the edge of the board. WinSystems offers the optional CBL-247-1 which adapts each serial channel to 9-pin male "D" connectors with PC-AT compatibility.

Line Printer Port - The PCM-SX contains a port that is configured as a bidirectional EPP/ECP printer port mapped at LPT1 (278-27F hex). Alternatively, it can be configured as two additional general purpose I/O ports if a printer is not required. The first port is configured as 8 input or output only lines. The other port is configured as 5 input and 3 output lines.

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CBL-247-1 LPT Connector Pin-Out

Pin	Flow	Signal
1	I/O	Strobe
2	I/O	Data Bit 0
3	I/O	Data Bit 1
4	I/O	Data Bit 2
5	I/O	Data Bit 3
6	I/O	Data Bit 4
7	I/O	Data Bit 5
8	I/O	Data Bit 6
9	I/O	Data Bit 7
10	IN	Acknowledge
11	IN	Busy
12	IN	Paper End
13	IN	Select
14	OUT	Autofeed
15	IN	Error
16	OUT	Init. Printer
17	OUT	Select Input
18-25	—	Ground

The LPT signal lines are wired to a 50-pin right angle connector. WinSystems' CBL-247-1 adapts the signals to a 25-pin female "D" socket connector with strain relief.

Keyboard Controller - An integrated 80C42 equivalent keyboard controller supports a PC/AT-type keyboard. It is accessed via the CBL-247-1 Multi-I/O adapter cable.

CBL-247-1 Keyboard Female Connector Pin-Out

Pin	Signal
1	Keyboard Clock
2	Keyboard Data
3	N/C
4	Ground
5	+5 volts

Status LED - A status LED is available on the board to monitor system activity. Under program control, it can indicate error conditions or blink different patterns to provide a visual indication of program status. There is also an activity LED on the IDE interface that blinks indicating data transfer in process.

Interrupts - Two 82C59A compatible interrupt controllers accept inputs from the onboard peripherals and the PC/104 Bus for a total of twelve selectable interrupt sources.

Timers - Three 82C54 compatible 16-bit timers are supported. Channel 0 is wired to interrupt channel 0, channel 1 generates the DRAM refresh using DMA channel 0 and channel 2 is used by the speaker port.

Real Time Clock/Calendar - A 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. The remaining 114 bytes of RAM holds all of the DOS setup information regarding hard and floppy disk types, video types, shadowing, wait states, etc.

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 condition, 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. This circuit also inhibits the processor's memory write line, preventing invalid data from being written to battery backed static RAMs or EEPROMs during power fluctuations.

Battery Back-up - A 125 mAH battery supplies the PCM-SX board with standby power for either or both SRAM memory sockets, 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 system drops below the battery voltage and back OFF again when Vcc returns to normal.

Speaker - An onboard piezo transducer is provided for sound generation. A beep code will be generated corresponding to the BIOS error codes (if required) during the power-up or reset sequence.

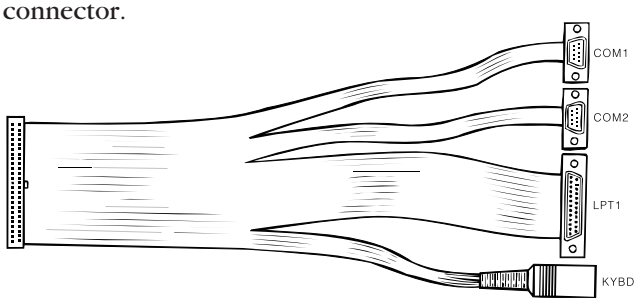
PC/104 Bus - The PCM-SX board is available with a 16-bit, stackthrough or non-stackthrough, PC/104 Bus connector. This allows multiple PC/104 modules to plug together to support video, LANs, analog, digital and other special purpose I/O functions.

Power - Power is brought into the board through an 8-pin connector. The +12 volts is wired directly to the PC/104 connector and is not used by the PCM-SX.

I/O Connector - WinSystems offers an optional Multi-I/O cable for the COM1, COM2, LPT1 and keyboard. These four ports are combined into one 50-pin header at the board's edge. The CBL-247-1 is a 1 foot adapter cable that offers a more convenient termination. COM1 and COM2 are 9-pin male "D" connectors with strain relief. LPT1 is a 25-pin "D" female

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socket with strain relief. The keyboard is a 5-pin DIN connector.



Drawing of CBL-247-1

SOFTWARE SUPPORT

The PCM-SX is designed to support both full PC-AT DOS compatible and embedded systems applications. An industry standard BIOS is supplied that provides configuration flexibility, performance and AT compatibility. It supports both 3.5 inch and 5.25 inch floppy disk drives, AT-compatible keyboards and other standard BIOS features. The BIOS also provides set up, power-on self test and boot diagnostics in ROM.

DOS - Since the PCM-SX is software compatible with the PC-AT, it will run the latest versions of DOS, Linux, Windows and OS/2. It will support other operating systems such as QNX and real-time executives that require a "PC-AT" hardware environment.

Software Developers Kit - WinSystems offers the SDK2-PCM-104 software developers kit to supply the necessary hardware, software and cables to begin program development with the PCM-SX board. It consists of Microsoft DOS 6.x, CBL-247-1 Multi-I/O cable, a 2GB or larger hard disk plus controller cable, an 1.44MB high density 3.5 inch floppy disk plus controller cable, and triple output power supply housed in an enclosure. This packaging permits easy access to the board, PC/104 modules, and peripherals during program development.

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 PCM-SX along with the RDK of your choice, WinSystems will jumper the CPU, program and install the Flash part to your PCM-SX. The RDK includes a PS-50W-1, PCM-POST, Flash memory, ROM-DOS, cables and utility software.

SPECIFICATIONS

Electrical

PCM-SX CPU Clock: 33 MHz
PC/104 Interface: 16-bit, non-stackthrough
16-bit, stackthrough version
Serial Interface: 2 Serial channels with RS-232 levels
RS-422/485 optional using the CK-75176 kit.
LPT Interface: Bidirectional line printer/EPP/ECP
IDE Interface: 16-bit, supports 2 drives
Floppy Disk Interface: BIOS supports one or two 360K/720K/1.2M/1.44M drives
Vcc=+5V ±5% at 375 mA typ: PCM-SX-33-2M

System Memory

Addressing: 16 Megabytes
Capacity: 2, 4, or 8 MB of surface mount DRAM

Solid State Disk

Capacity: One 32-pin memory socket supports up to 512KB SRAM or Atmel Flash, 1MB EPROM, or up to 48MB DiskOnChip®

Mechanical

Dimensions: 3.6" x 3.8" (90 mm x 96 mm)
Weight: 2.5oz. (70gm)

Connectors

Serial, Parallel, Keyboard:	50-pin 0.100" grid
Floppy Disk Interface:	34-pin 0.100" grid
IDE Interface:	40-pin 0.100" grid
PC/104 Bus:	64-pin 0.100" socket
	40-pin 0.100" socket
Power:	8-pin in-line Molex

Environmental

Operating Temperature: -40°C to +85°C

ORDERING INFORMATION

PCM-SX-33-2M	2MB, 33 MHz, PC/104 SBC
PCM-SX-33-2M-ST	Stackthrough connector version
PCM-SX-33-4M	4MB, 33 MHz, PC/104 SBC
PCM-SX-33-4M-ST	Stackthrough connector version
PCM-SX-33-8M	8MB, 33 MHz, PC/104 SBC
PCM-SX-33-8M-ST	Stackthrough connector version
RDK-PCM-249-XF	ROM-DOS Developers Kit
SDK-PCM-104	Software Developers Kit
FLASH-MD2000-DXX	DiskOnChip2000®, where XX = 8MB to 288MB memory storage
CBL-174-1	Power cable for the board
CBL-247-1	1 ft., Multi-I/O adapter cable
CK-75176-2	RS-422/485 chip kit for 1 channel

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