

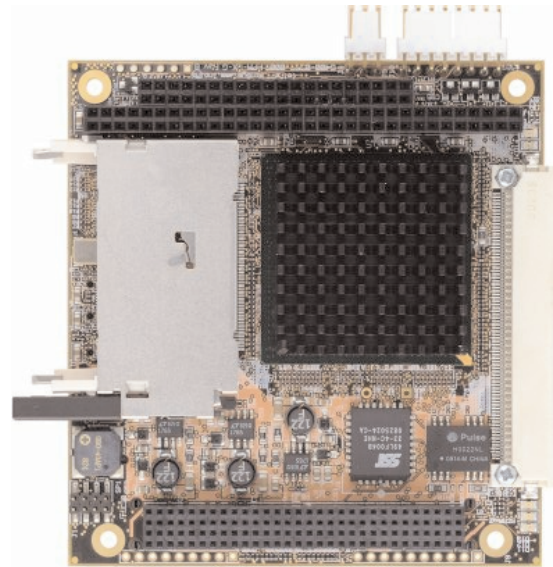
FEATURES

- AMD LX800; x86-compatible CPU
- PC/104-Plus module, 3.6" x 3.8" (90 mm x 96 mm)
- Up to 1 GB of SODIMM system SDRAM supported in a 200-pin SODIMM socket
- Socket for a bootable Type I or II CompactFlash
- PC-compatible; supports Linux, Windows® XP embedded, DOS, and other x86-compatible RTOS
- High-resolution video controller supports:
 - Simultaneous analog CRT or LCD operation
 - CRT resolutions up to 1920 x 1440
 - Panel resolutions up to 1600 x 1200
 - Color panels up to 18-bits/pixel
 - Backlight power
 - Digital flat panel
- Custom splash screen on start up
- 10/100Mbps Intel 82551ER Ethernet controller
- Four asynchronous serial ports with FIFO.
Two RS-232 only and two with RS-232/422/485 levels
- 16 bi-directional TTL digital I/O lines all capable of event sense and interrupt generation
- Bi-directional LPT printer port
- Two USB 2.0 ports with overcurrent protection
- Supports booting from USB device
- Ultra DMA EIDE controller for one or two devices
- PC/104 and PC/104-Plus expansion connectors
- PS/2 keyboard controller and PS/2 mouse support
- AC97 Audio with MIC, Line In, and Line Out
- Real time clock, programmable watchdog timer, and powerfail reset
- Activity LEDs onboard for visual status

The PPM-LX800-G is a highly integrated, PC/104-Plus single board computer (SBC) designed for embedded, space-limited, low power applications. This full-featured SBC includes AMD's LX800 x86-compatible CPU, CRT and flat panel video controller, 10/100 Ethernet, two USB 2.0 ports, 16 lines of digital I/O, and four COM channels on a single industry standard 90 mm x 96 mm module.

It also includes the standard PC controllers for IDE hard disks, CompactFlash devices, mouse, keyboard, AC97, audio, and LPT. The PPM-LX800-G's x86-PC software compatibility assures a wide range of tools to aid in your applications program development and checkout. It supports both Windows® XPe and Linux operating systems.

Its low power dissipation permits fanless operation over a temperature range from -40° to +85°C. This board is well suited for rugged applications requiring mid-range processor performance in an embedded PC design.



- Onboard speaker available for sound generation
- Long-term product availability
- Quick Start Kits for software development
- Extended operating temperature: -40°C to +85°C
- RoHS compliant
- Upgrade for PPM-GX500 and PPM-TX
- +5 Volt only operation

FUNCTIONAL CAPABILITY

Processor - The PPM-LX800-G is built with the low power AMD LX800 MHz 0.9W with 64KB of I-cache, 64KB of D-cache and 128KB of L2 cache. Its 32-bit x86/87 core allows PC compatible software to run. Also, the integrated FPU supports the Intel MMX™ and AMD 3DNow!™ technology instruction sets for increased performance for communications and multi-media applications. The CPU supports a PCI 2.2 compliant 32-bit interface operating at 33MHz.

System Controller - An onboard AMD CS5536 contains integrated controllers for audio (AC97), hard disk drive (ATA-6), USB 2.0, and power management. It also provides the core logic that makes the board PC/AT software compatible including integrated peripheral controllers (two 82C37-compatible DMAs, 82C54-compatible timer, two 82C59-compatible PICs), RTC with CMOS RAM, SMBus controller, and LPC Bus.

Memory - The board supports up to 1GB of 64-bit wide DDR-1 400MHz Synchronous DRAM that plugs into a 200-pin socket on the back of the board. The board is shipped from the factory with no memory installed. The 200-pin SODIMM connector permits the user to either install and/or upgrade the memory capacity in the field. WinSystems can supply the SODIMM200-G-27-128, -256, -512, and -1G which are 128MB, 256MB, 512MB, and 1GB RoHS-compliant memory modules qualified for use on this board.

CompactFlash - A connector is on the top of the board that will accept Type I and II CompactFlash (CF) cards. The connector is wired to the primary IDE channel. A designer can use bootable CompactFlash cards as data storage for applications where the environment is too harsh for rotational hard disks or floppy disk drives.

WinSystems offers industrial-grade CompactFlash cards that can be used to boot and store data like a solid state disk drive while operating from -40° to +85°C for high capacity, harsh embedded applications. The sustained data transfer rate is very fast, plus an on-card wear leveling algorithm extends the number of write cycles to the part. These RoHS-compliant cards will fit into any computer, SBC, or instrument with a CompactFlash socket. For more information, go to www.industrialcompactflash.com



WinSystems' Industrial CompactFlash

BIOS - The PPM-LX800-G uses the Insyde BIOS. It supports advanced features such as custom splash screen, APM 1.2 and ACPI 1.0b power management modes. The BIOS also supports legacy operation of a USB keyboard and mouse, as well as booting from a USB floppy disk, USB keys, and other USB-connected mass storage devices. The PPM-LX800-G can also boot from a CompactFlash device.

The BIOS is located in EEPROM. Users can save their custom CMOS values in a nonvolatile storage area for consistent behavior at bootup. The BIOS allows the PPM-LX800-G to operate without a keyboard, display or disk drive attached.

Remote Booting - The PPM-LX800-G supports remote booting for use as a diskless network computer. Contact a WinSystems' application engineer for companies that supply remote boot software.

IDE Controller - The PPM-LX800-G incorporates an ATA-6 compatible IDE controller. This interface is for hard disks, CompactFlash, and other devices. This controller supports UDMA (up to UDMA mode 5), MDMA, and PIO modes. The controller can support one channel (two devices) which is wired to the IDE connector and the CompactFlash connector. An activity LED blinks during data transfer to provide visual status information.

Floppy Disk Support - Floppy disk support is through the use of USB compatible drives.

Video - A high-performance BitBLT/vector engine is integrated into the graphics processor in the AMD LX800 CPU that supports both a standard analog SVGA and flat panel displays simultaneously. The video controller uses a shared memory architecture and includes hardware frame buffer compression to improve memory efficiency. The controller supports a wide variety of TFT active LCD panel displays as well as standard CRTs. It can support resolutions up to 1920 x 1440 x 32 bpp at 85Hz for CRTs and 1600 x 1200 for flat panels with a 24-bit interface.

CRT Video Interface - The SVGA video output signals are wired to a 14-pin dual-in-line connector at the edge of the board. An optional CBL-234-G-1-1.375 interface cable adapts it to a standard female 15-pin "D-Sub" type connector commonly used for VGA. Simultaneous operation of the CRT and LCD is supported.

Flat Panel Display Support - The PPM-LX800-G supports active-matrix TFT, 4:3 aspect ratio flat panels via a 31-pin Hirose connector. The board properly sequences the power for logic voltage and the backlight inverter to provide intelligent and safe power sequencing to the panel. Contact a factory application engineer for flat panel selection support.

Ethernet Controller - An Intel 82551ER is the 32-bit PCI Ethernet controller chip that provides high-speed data transfers. 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-LX800-G.

USB - This board has two USB 2.0 ports for simple connectivity with peripheral devices. Each port has over-current and in-rush protection provided by a National Semiconductor LM3526 power switch. Each device is a dual stage design including a thermal protection circuit. During a short-circuit/over-current event, the switch dissipating excessive heat is turned off, allowing the second switch to continue to function uninterrupted. Therefore, a fault on one channel will not affect the other. No fuses are required since protection is done electronically by the circuit.

Both USB ports are wired to an 8-pin 2 mm connectors. The CBL-275-G-1-0.50 is the optional interface cable adapter that has two standard female USB connectors.

Serial Communications - Four independent, full-duplex, serial asynchronous channels are onboard. Both the send and receive registers of each channel has a 16-byte FIFO. This device is a quad 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-LX800-G only requires +5 volts to operate.

COM1 and COM2 also have software selectable RS-422/485 support. No jumpers are required. The RS-422/485 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.

All serial channels are configured as Data Terminal Equipment (DTE). COM1 through COM4 are wired to a 80-pin, multi-I/O connector at the edge of the board.

Digital Input/Output - The PPM-LX800-G contains a versatile 16-line digital I/O controller. There are 16 bits of TTL-compatible digital I/O divided into two, 8-bit ports. Each I/O line is individually programmable for input, output, or output with read-back operation. Each output channel is latched and has an open collector driver (with a pull-up resistor) capable of sinking 12mA of current. This allows direct control of up to 16 optical isolated signal conditioning modules to a single card for high density I/O support. Contact a WinSystems' factory application engineer for further information and support for these modules.

The major feature of the onboard digital I/O controller is its ability to monitor the 16 lines for either rising or falling digital edge transitions, latch them, and then interrupt the host processor notifying it that a change-of-input status has occurred. Transition polarity is programmable and enabled on a bit-by-bit basis. Each line's transition is latched by the event so that even short duration pulses will be recognized. An interrupt ID register is maintained for each line for writing more efficient Interrupt Service Routines. This is an efficient way of signaling the CPU of real-time events without the burden of polling the digital I/O points.

Line Printer Port - The PPM-LX800-G has a parallel LPT printer port that may be operated in a bi-directional mode. The printer port can also be used as two additional general-purpose I/O ports if a printer is not required. The first port is configured as eight input or output only lines. The other port is configured as five input and three output lines.

Keyboard/Mouse Controller - An 80C42 equivalent controller supports a PS/2-compatible keyboard. It is wired to the 80-pin multi-I/O connector. The CBL-251-G-1-1.5 adapter cable provides the mate to a PS/2 type keyboard.

The mouse and keyboard can also be attached via the USB cable if the operating system you choose supports this feature.

AC97 Audio - The PPM-LX800-G has an AC97 digital audio controller. A 10-pin, 2 mm connector provides access to stereo Line Out, Line In, and Microphone In via the CBL-270-G-1-1.5 adapter cable.

I/O Access - Connector space is limited on the PPM-LX800-G because of its high I/O content. Two, 80-pin, connectors provide access to the disk controllers, serial channels, digital I/O, 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-G-1-1.5 is a 1.5 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-352-G-1-1.5 is a 1.5-foot long multi-drive cable for the digital I/O and IDE hard disk drives. The digital I/O portion is terminated in a 50-pin socket on 0.100" centers. The IDE cable is terminated into a 40-pin socket on 0.100" centers that can be plugged directly into a hard disk drive.

Interrupts - Two 82C59A compatible interrupt controllers accept inputs from the onboard peripherals and the PC/104 Bus for a total of twelve software selectable interrupt sources. Also four PCI interrupt sources are supported on the PC/104-Plus Bus which are PnP compliant.

Status LED - A status LED is 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 enabled, retriggerable watchdog timer is provided. The timeout period is software adjustable from 1 to 255 seconds or from 1 to 255 minutes. The time period can be changed by writing to a register even after initial boot up. If enabled, the watchdog timer must be updated at least once during the period otherwise a failure is assumed and the board will be reset. This circuit is important for use in remote and unattended applications.

Speaker - The PPM-LX800-G's onboard speaker is available for sound generation.

Power - Power is supplied via an 8-pin Molex connector. Both ± 12 volts are wired directly to the PC/104 and PC/104-Plus connector. The +12V is also wired to the switch for the panel back light control.

Power Fail Reset - A precision voltage circuit 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 - An optional off-board battery supplies the PPM-LX800-G board with standby power for the real time clock and CMOS setup RAM. The power supervisory circuit senses the off-board voltage and automatically switches to internal power when it drops below normal.

The board will operate without a battery since there is an EEPROM on board to store the CMOS set-up data. However, current time and date information would not be maintained when the main +5V power is not present. An optional BAT-LTC-E-36-16-1 or BAT-LTC-E-36-27-1 battery is available from WinSystems that plugs into the on board 3-pin Molex connector.

PC/104 Expansion - The PPM-LX800 has both a 16-bit PC/104 and a 32-bit PC/104-Plus interface and connector. PC/104 is electrically equivalent to the ISA Bus and PC/104-Plus is equivalent to the PCI Bus for I/O functions requiring higher data transfer speeds. However, it does not support DMA transfers on the ISA portion of the PC/104 Bus.

The PPM-LX800-G provides a common computer core from which engineers can add off-the-shelf or user-designed, application-specific PC/104 and PC/104-Plus modules. These modules 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. Thousands of module functions include analog and digital I/O, serial I/O, GSM/GPRS/CDMA/802.11/ZigBee wireless, customer designed I/O cards, etc.

PPM-TX & PPM-GX500 Upgrade and Replacement - This board is designed to be a performance/feature upgrade and replacement for current users of our PPM-TX and PPM-GX500 boards. For question about any differences in the two boards or new software drivers that may be needed, please contact the factory.

Engineering Support - WinSystems provides free technical phone support to assist customers with system integration of our SBCs and I/O modules in their design.

Long life availability - This board is based on chipsets to ensure longevity of the PPM-LX800-G's core technology.

Enclosures - WinSystems' offers a rugged enclosure that allows a designer to package a variety of system configurations quickly and easily. Applications include military/defense, communications/networking, industrial data acquisition, control, and instrumentation. Go to <http://www.winsystems.com/indexHardware.cfm?hwview=enclosures>

SOFTWARE

The PPM-LX800-G is an x86-compatible SBC. It is designed to run both 16-bit and 32-bit x86 instruction set software and is compatible with Microsoft's Windows® XP embedded operating systems (OS) as well as the applications that run on them. It also supports Linux and many other PC-compatible x86 OS such as QNX, VxWorks, or other real-time executives that require a PC hardware environment.

Developer Kits - WinSystems offers Developer Kits to provide the necessary hardware, software and cables to begin program development with the PPM-LX800-G board. The kit's packaging permits easy access to the SBC, PC/104 modules and peripherals during program development.

The kit consists of a DVD-ROM drive, floppy disk drive, hard disk drive, and power supply mounted in a black, light-weight, aluminum enclosure. Also included is the selected operating system, cables, and the PCM-POST, a PC/104 module for debugging support.

Board Support Packages for select operating systems are also available with our Developer Kits. Currently Windows XP embedded, Linux and DOS/sockets OS are supported. Additional support may be offered for other operating systems. Please contact a WinSystems' Applications Engineer if you need support for an OS that is not listed above.

In general, Developer Kits provide a specific OS "sample image" that is preloaded on a Flash disk and is ready to run right out of the box. Most kits also include Quick Start Guides, documentation designed to lead you through the process of recreating the embedded OS sample image that

was provided in the kit. These Quick Start Guides provide a wealth of valuable, time-saving information that will help you quickly overcome a large portion of the learning curve if you are new to a particular operating system.

Please visit the Developer Section of our website for more details about each individual Developer Kit.

SPECIFICATIONS

Electrical

PPM-LX800 CPU Clock: 500MHz actual, 800MHz eq.
PC/104 Interface: 16-bit
PC/104-Plus Interface: 32-bit PCI
Ethernet: 10/100 megabits/second
USB 2.0: Two ports
Serial Interface: Four serial channels all with RS-232 levels, two of the channels support RS-422/485 electrical levels
CRT: Resolutions up to 1920 x 1440
Flat Panel: Resolutions up to 1600 x 1200 x 24-bit
Audio: AC97 with MIC In, Line Out and Line In
LPT Interface: Bidirectional LPT
IDE Interface: Supports two drives (UDMA)
Keyboard: PS/2 controller or USB interface
Mouse: PS/2 controller or USB interface
Vcc = +5V ±5% at 1.2A typical

System Memory

Capacity: Up to 1GB with a 200-pin SDRAM in a SODIMM connector

Solid State Disk

Capacity: One, Type I or II CompactFlash socket

Mechanical

Dimensions: 3.6" x 3.8" (90 mm x 96 mm)
Weight: 4.6 ounces (130 grams)
Jumpers: 2 mm square posts

Connectors

COM1-4, LPT, Mouse, Keyboard, ENET, Reset: 80-pin
Digital I/O and IDE: 80-pin
CRT: 14-pin, 2 mm
Flat Panel: 31-pin Hirose
Backlight Power: 5-pin in-line Molex
USB: 8-pin, 2 mm
Audio: 10-pin, 2 mm

PC/104 Bus: 64-pin, 0.100"
40-pin, 0.100"
PC/104-Plus: 120-pin (4 x 30, 2 mm)
with shrouded header
Power: 8-pin in-line Molex
Battery: 3-pin in-line Molex

Environmental

Operating Temperature: -40 C to +85 C
Non-condensing relative humidity: 5% to 95%

ORDERING INFORMATION

PPM-LX800-G PC/104-Plus LX800 SBC with
video, Ethernet, and digital I/O
PPM-LX800-G-ST PC/104-Plus LX800 SBC with
video, Ethernet, digital I/O, and
PC/104 stackthrough connectors

Developer Kits

DV-S-359-L30 Linux (2.6 kernel) Developer Kit,
includes software, hardware,
enclosure, and cables
DV-S-359-R Software Developers Kit for
ROM-DOS including SDK4
DV-S-359-XP-2007 Windows XPe Developer Kit,
includes software, hardware,
enclosure, and cables

System Memory - (DDR PC2700 SDRAM)

SODIMM200-G-27-128M 128Mbyte RoHS device
SODIMM200-G-27-256M 256Mbyte RoHS device
SODIMM200-G-27-512M 512Mbyte RoHS device
SODIMM200-G-27-1G 1Gbyte RoHS device

-40°C to +85°C Industrial CompactFlash Memory

CFLASH-G-128M-I 128MB CFlash - RoHS
CFLASH-G-256M-I 256MB CFlash - RoHS
CFLASH-G-512M-I 512MB CFlash - RoHS
CFLASH-G-1024-I 1GB CFlash - RoHS
CFLASH-G-2048-I 2GB CFlash - RoHS
CFLASH-G-4096-I 4GB CFlash - RoHS
CFLASH-G-8192-I 8GB CFlash - RoHS

Larger CompactFlash capacities and faster Write speeds
to be released soon.

Cables

CBL-SET-359-1 Cable Set includes:
CBL-251-G-1-1.5 Multi I/O breakout
CBL-352-G-1-1.5 IDE and digital I/O breakout
CBL-234-G-1.375 14-pin Hirose to 15-pin D-sub
CBL-270-G-1-1.5 Audio input/output cable
CBL-275-G-1-0.5 Dual USB adapter cable

Optional Batteries

BAT-LTC-E-36-16-1 External 3.6V, 1650 mAh
battery with plug-in connector
BAT-LTC-E-36-27-1 External 3.6V, 2700 mAh
battery with plug-in connector

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