Performance Technologies PT-VME 340

High Speed Synchronous Communications Controller

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Model PT-VME340
High Speed Communications Controller

Features
Benefits

- ◆ Four Channel high speed intelligent communications controller
  Offloads communications functions from the host CPU, which translates directly to higher overall system performance

- ◆ Powerful onboard 40 MHz Motorola MC68EC030 MPU
  14 MIPS of processing power means you get the benefit of high-speed performance with minimal system utilization

- ◆ Either 1 or 4 MBytes of Shared DRAM Memory
  Large memory buffer ensures handling heavy traffic without compromising data integrity or system performance

- ◆ Comprehensive VMEbus interface including VME64™
  Backplane communications speed of up to 60 MBytes/sec from the originators of the VME64™ standard

- ◆ Easy to change, user definable line interfaces
  Select from RS-232/449/530/485/V.35/MIL-STD-188C/114.
  Regardless of your interface needs, PTI can supply a solution

- ◆ Front or rear SIO cabling scheme
  Connecting cables utilize industry standard shielded connectors for the maximum in system configuration flexibility

- ◆ Intelligent 8 channel 16 bit I/O DMA controller coupled with four second generation Z16C32 communication controllers
  Data moves on and off the VMEbus very quickly

- ◆ VMEbus system controller, interrupter and interrupt handler
  Built in system services make for easy integrations

- ◆ Extensive third party communication protocol support including:
  HDLC, SDLC, X.25, Frame Relay, HDLC LAPB, HDLC NRM, DDCMP, ADCCP CD-2, Sync B, Sync Bit Stream/Stream Receiver, Financial Market Feed, Etc.
  Spider X.25
  Communications development tool kit
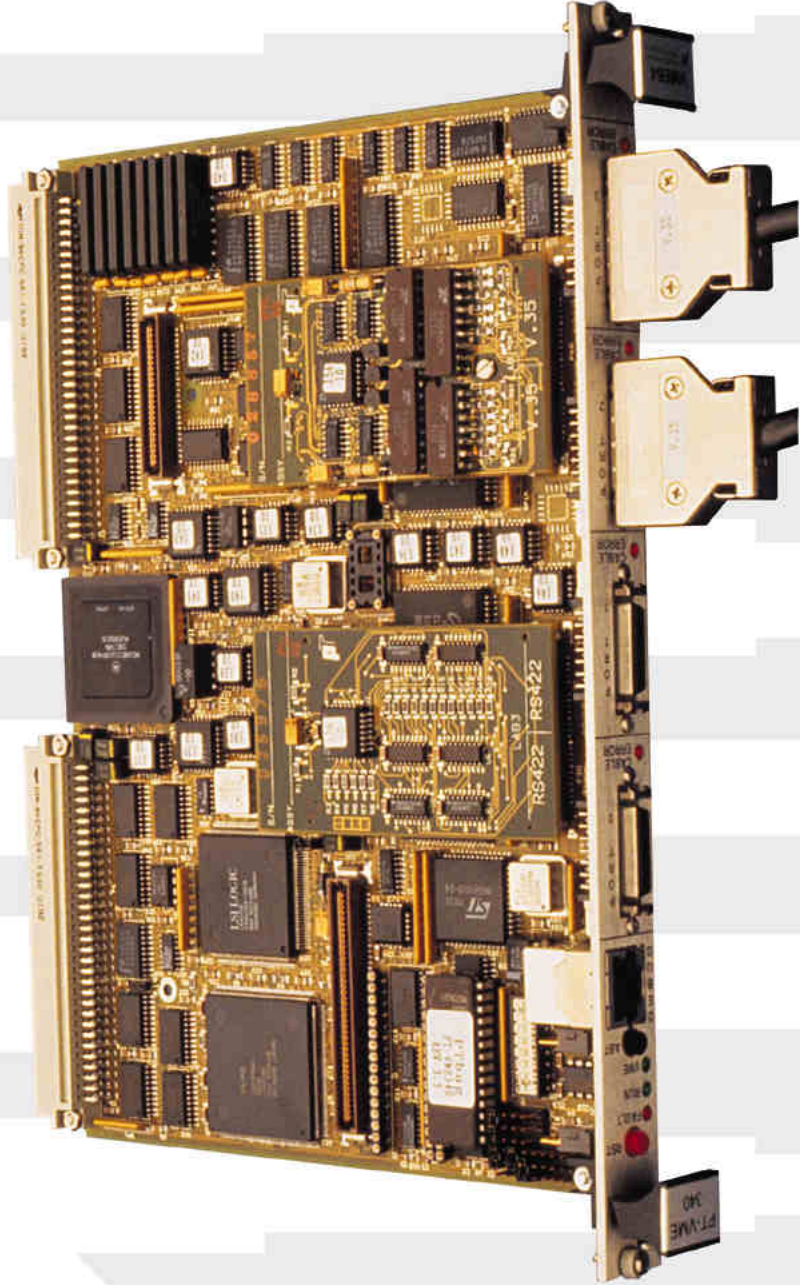
Hardware Features

The PT-VME340 High Speed Synchronous Communications Controller offers a flexible, high performance Wide Area Network interconnect solution for the VMEbus. The architecture of this controller has been specifically designed to support the increasing serial data rates found in today's wide area communication networks. The PT-VME340 utilizes a state of the art serial I/O controller interface coupled to a 40 MHz/32 bit 68EC030 microprocessor core supporting sustained data rates up to 10 Mbit/sec. Maximum throughput and efficient use of the serial I/O lines to the VMEbus is assured by providing 60 MByte/sec VME64™ transfer performance.

The PT-VME340 design uses plug-on Line Adapter Boards (LABS), providing a high degree of flexibility. The LABS provide a user changeable interface that adapts the controller to V.35, RS-232C, RS-449/422, RS-530/422, RS-485, MIL-STD-188C and MIL-STD-188/114A electrical interfaces.

Z16C32 IUSC

The second generation Zilog Z16C32 IUSC (Integrated Universal Serial Controllers) provides the PT-VME340 with four ports of advanced multi-protocol serial I/O capabilities. The 16C32 can be programmed to handle asynchronous formats, synchronous byte-oriented formats such as IBM bisync, and bit-oriented protocols such as HDLC, IBM SDLC and SDLC loop mode.

Asynchronous modes support all common async baud rates and options such as programmable data/stop bits, error detection, etc. Synchronous modes provide internal synchronization on one or two characters plus CRC generation and checking with CRC-16 or CRC CCITT. SDLC/HDLC modes offer comprehensive frame level control.

Intelligent transmit and receive DMA channels allow the IUSC to retrieve its own transmit data from memory, store its received data, reprogram itself and automatically store status information in memory. The advanced DMA can operate in one of four modes:

Single Buffer Mode—This is the traditional mode of DMA operation used in first generation SIO controllers. It requires reprogramming after each block transfer.

Pipelined Mode—This mode uses two sets of buffer address and length registers. The PT-VME340 controller software can program one set while the DMA channel is using the other.

Array Mode—In this mode the PT-VME340's CPU, under software control, programs the transmit DMA channel with table based information containing addresses, lengths and control information associated with actual memory buffers. When operating in this mode, the IUSC finishes transferring the data associated with one address/length descriptor and automatically proceeds to the next descriptor without requiring the controller to continually program the next block transfer.

Linked List Mode—This is similar to Array Mode, particularly in its capability to switch buffers rapidly for each of the multiple successive short frames. It also includes a capability for dynamic updates as in Pipeline Mode.

The IUSC supports a number of additional advanced features that reduce turn around time and processing requirements normally associated with character level I/O.

The PT-VME340 CPU supports sustained throughput at high data rates by using the Z16C32 interrupt architecture to relieve the CPU of many real-time service requirements. The IUSC also includes a full 16 bit wide data interface to the PT-VME340 controller logic. With this extended data width, the IUSC effectively supports DMA channel peak transfer rates up to 10.7 MByte/sec. Based on the capabilities of the IUSC, the advanced architecture of the PT-VME340 controller will sustain four SIO ports at 4 Mbit/sec, 2 SIO ports at 7 Mbit/sec, or 1 SIO port at 10 Mbit/sec, in full duplex, local loopback mode. (Request Application Note VME041 for detailed information on the "PT-VME340 Serial I/O Performance Analysis".)

LABs/SIO Signal Distribution

Each serial I/O channel supports up to eight modem control signals; four inputs and four outputs. Every SIO channel also provides receive data, transmit data and clock signals. Applications requiring serial clock frequencies that differ from the modem clock inputs can use an optional clock oscillator installed on the PT-VME340 controller.

Line Adapter Boards (LABS) provide physical SIO line driver and receiver interfaces. The LAB is a small daughter module, approximately the size of a business card, which plugs onto the PT-VME340. The LABS provide electrical adaptation from the controller's onboard TTL logic levels to the appropriate communications interface signal levels.

The user can configure the serial line interface on a "two port" basis by selecting of the appropriate LAB (each PT-VME340 will accept up to two LABS). External connectivity is provided through a passive cabling scheme. Each LAB is supplied with two six foot shielded transition cables that interface to the PT-VME340's 26 pin subminiature D connectors on the controller module. The opposite end of the transition cable includes the appropriate connector for the LAB (i.e., DB-25 for RS232, DB-37 for RS-449/442, etc.).

The LABS on the PT-VME340 controller platform can be configured in one of two cabling modes. These are: 1) all four SIO ports connected to the transition cables through the modules front plate; 2) two of the four ports connected to exit the module via the VMEbus P2 connector. (SIO interconnection via the P2 connector is limited to two ports due to the 64 user defined connections available through the P2 connector.

PTI has developed a variety of LABs for a broad range of applications. The following line interfaces are available: RS-232C, RS-449, RS-530, RS-485, MIL-STD-188C/114A, RS-232C/449 Combo, and V.35. (Request Application Data Sheet VME042 for detailed information on each LAB type.) Custom line interfaces can also be implemented by customer or PTI designed LABs.

Onboard Microprocessor

The PT-VME340 controller architecture is based on the 40 MHz, 32 bit, Motorola 68EC030 microprocessor unit. The onboard intelligence of the PT-VME340 allows it to handle much of the low level communications activities that typically would burden the host CPU. This can greatly enhance overall system performance.

Onboard Memory

Application requirements for local memory on the PT-VME340 are supported by a combination of a resident DRAM array (1 or 4 MByte), an optional SRAM array, and two 32 pin JEDEC ROM/EPROM/FLASH locations.

The DRAM array decouples the VMEbus and MPU activities from that of the Z16C32s through separate onboard buses (see block diagram). This architecture isolates the VMEbus, with its unpredictable latencies, from the real-time requirements of the Controller's serial I/O communications subsystems. The shared DRAM array also provides a sufficient buffer to assure complete data communication integrity at sustained high speed data rates.

An optional 32-bit wide 20 nanosecond SRAM array card can also be installed to provide an extended level of CPU performance for applications requiring maximum onboard processor capability. This plug-on SRAM module is available in two sizes, 256KByte or 1 MByte.

Two 32 pin JEDEC standard sockets provide up to 1 MByte of permanent storage for boot code. A 1Kbit serial EEPROM also supports nonvolatile storage for user defined controller parameters.
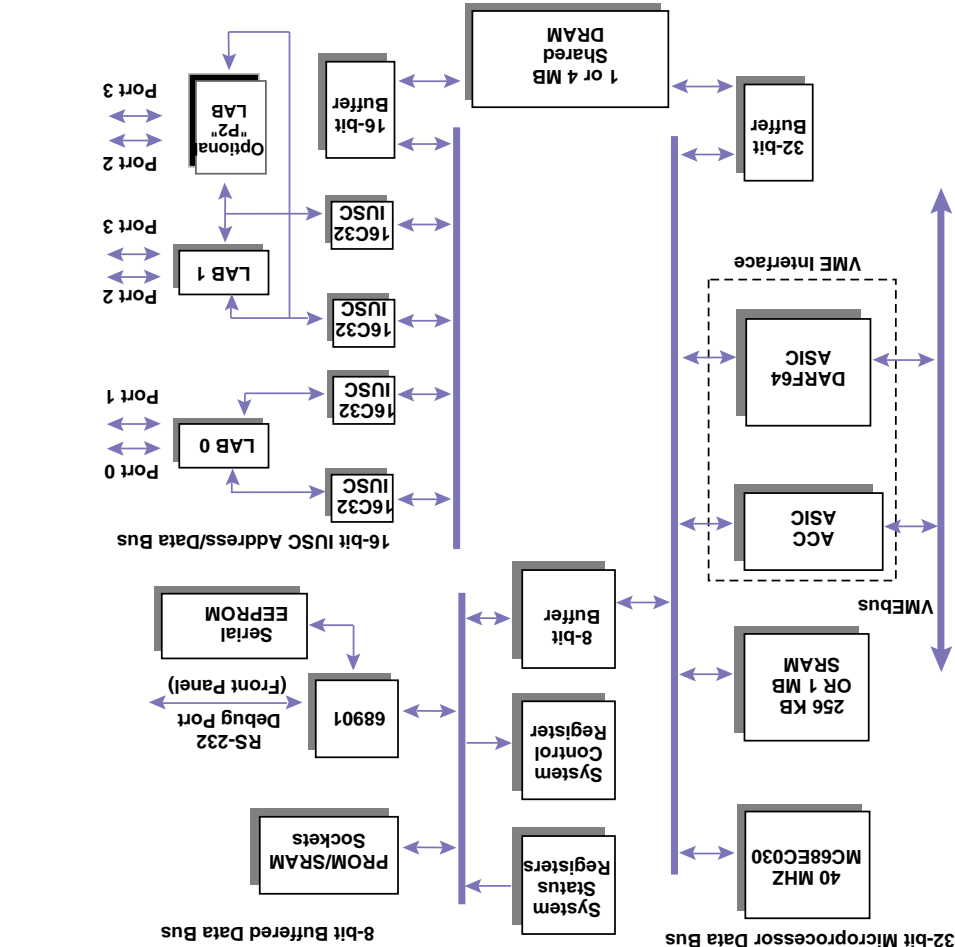
VMEbus Interface

The PT-VME340 supports all standard VMEbus data and operating modes, including the VME64™ mode pioneered by Performance Technologies. Operating in VME64™ mode, the PT-VME340 can burst data over the VMEbus at rates approaching 60 MBytes/sec, making it ideal for applications that require maximum VMEbus utilization.

In addition to the VME64™ operating mode, the PT-VME340 includes a comprehensive high performance 32 bit VMEbus interface fully compatible with the IEEE 1014 VMEbus specification. The interface supports BLT (standard block transfer), MBLT (VME64™, multiplexed block transfer), and all standard VMEbus data and address transfers. Using it's integral DMA in the VMEbus master mode, the PT-VME340 provides high performance transfers to/from the VMEbus. The onboard CPU has memory mapped access to the VMEbus as a master in A32/A24/ A16: D32/D16/ D08(EO), UAT, and RMW modes.

As a VMEbus slave, the PT-VME340 provides A32/A24: D64MBLT/ D32BLT/ D16BLT/D32/D16/D08(EO), UAT, and RMW interfacing. A Location Monitor and associated message queue offers excellent support for VMEbus inter-module (mailbox) communications. Programmable slave address mapping and access protection are also provided for the DRAM. A complete system controller implementation handles VMEbus arbitration, IACK daisy chain and SYSCLK drivers and SYSRESET generation.

Software Development and Support

To facilitate application development, a number of features have been incorporated into the PT-VME340. For debugging, the module includes a serial I/O port that supports full duplex asynchronous serial communication at rates up to 38.4 Kbaud. A "local bus timeout monitor" and a "watchdog" timer help ensure system integrity. Two additional general purpose timers can be programmed to generate periodic vectored interrupts.

Block Diagram Labels

16-bit IUSC Address/Data Bus
- Optional "P2" LAB — Port 2, Port 3
- LAB 1 — Port 2, Port 3
- LAB 0 — Port 0, Port 1
- Z16C32 IUSC (×4)
- 16-bit Buffer
- 1 or 4 MB Shared DRAM
- 32-bit Buffer

8-bit Buffered Data Bus
- Serial EEPROM
- RS-232 Debug Port (Front Panel)
- 68901
- 8-bit Buffer
- System Control Register
- System Status Registers
- PROM/SRAM Sockets

32-bit Microprocessor Data Bus
- 40 MHZ MC68EC030
- VME Interface
- DARF64 ASIC
- ACC ASIC
- VMEbus
- 256 KB OR 1 MB SRAM

Software Development Tools

Comprehensive software development and support tools for the OEM or System Integrator are available from Performance Technologies and selected third parties. The tools include basic software developed by PTI and more advanced tools provided in conjunction with third parties specializing in data communication products, training and support.

Basic development tools for the PT-VME340 include a full debug/monitor (PTbug) program. The PTbug low level debug/monitor allows software downloads based on Motorola defined S-records, sets/clears break points, views shared memory, performs memory test and monitors the execution of software written for the PT-VME340.

Third Party Communication Software

More comprehensive software support is provided by several third party organizations who specialize in communication protocols and development tools. Software available from these organizations include a specialized tool kit designed specifically for development of data communication protocols. The tool kit includes: A real-time environment for the PT-VME340 utilizing its onboard intelligence; a variety of low level protocol templates (HDLC, BiSync, Async), host, driver and software support tools/compilers, symbolic debuggers, etc.

A number of fully developed protocols are also available through these organizations. They operate on the PT-VME340 in Sun OS/Solaris, HP UX/RT, DG/UX, and VxWorks environments. The protocols include HDLC, LAPB/NRM, Frame Relay, DDCMP, SDLC, X.25, B.25, Military Protocols (ADCCP, CD-2, Sync Bit Stream Receiver), and Financial Protocols (MarketFeed 2000, Data Feed Receiver, Telekurs Data Feed Receiver, 3270, BSC 3780, etc.)

Performance Technologies can assist in providing additional information for contacting with these third party organizations.

Specifications

Processor:	68EC030 MPU @ 40 MHz
VMEbus Interface:	
DTB Master:	(DMA) A32/A24/A16: D64MBLT/D32BLT/D16BLT/ D32/D16/D8(E0) (CPU) A32/ D32/D16/D8(E0), A24/A16:D32/D16/D8(E0), UAT, RMW
DTB Slave:	A32/A24: D64MBLT/D32BLT/ D16BLT/D32/D16/D8(E0), UAT, RMW
DTB Requestor:	R(0)-R(3) DYN (ROR/RWD/ ROBC)
INT Handler:	IH(1)-IH(7)
INT Requestor:	IR(1)-IR(7)
	Full System Controller w/Auto-Program Option
Temperature:	0°C to 55°C, Operating Ambient
Humidity:	0% to 90%, Non-Condensing
Vibration:	Designed to Meet 5-100Hz with 2g Acceleration
Mechanical Shock:	Designed to Meet 20g for 6ms (half sine)
Physical:	Width: 234mm (9.2 inches) 6U Depth: 160mm (6.3 inches) Front Panel: 20.3 mm (8 inches) 4HP
Debug Async Ports:	MC68901 Based, Configured as Data Terminal Equipment (DTE)
Power Requirements:	+5VDC + 5% @ 3 A Typical (w/o LABs or SRAM): +12VDC + 5% @ 42 mA Typical -12VDC + 5% @ 42 mA Typical
Memory Capacity:	SRAM - 1 or 4 MBytes SRAM - 256 KBytes or 1 MByte (optional)
Serial I/O Controller:	Zilog Z16C32, Four Integrated Serial Communication Controllers @ 20 MHz

Specifications subject to change.

Ordering Information

PT-VME340-10390	1,2	Controller Module w/ 1 Megabyte DRAM
PT-VME340-10391	1,2	Controller Module w/ 4 Megabyte DRAM

Options

PT-MEM1xx-10249	Optional Add-on SRAM, 256 Kbytes 20 ns
PT-MEM1xx-10250	Optional Add-on SRAM, 1 Mbyte, 20 ns
PT-ACC340-10387	Optional P2 Adapter for Ports 3 and 4
PT-VME800-10393	PTbug Monitor/ Debugger

Line Adapter Boards

PT-LAB002-10262	2 x RS-232C w/6' cables
PT-LAB003-10263	2 x RS-449 w/6' cables
PT-LAB003-10321	2 x RS-530 w/6' cables
PT-LAB004-10322	2 x RS-485 w/6' cables
PT-LAB005-10323	2 x MIL-STD-188C w/6' cables
PT-LAB006-10324	2 x MIL-STD-188- 114A w/ 6' cables
PT-LAB007-10417	1 ea. RS-232/449 Combo w/6' cables
PT-LAB008-10486	2x V.35 w/6'cables

Notes:

(1) Each PT-VME340 must be ordered with 1 or 2 Line Adapter Boards (LABs).

(2) The PT-VME340 may be optionally ordered with Rear Panel Breakout ("P2") for ports 2 and 3 ONLY. Please include PT-ACC340-10387 when requesting Rear Panel Breakout.

Specifications subject to change.