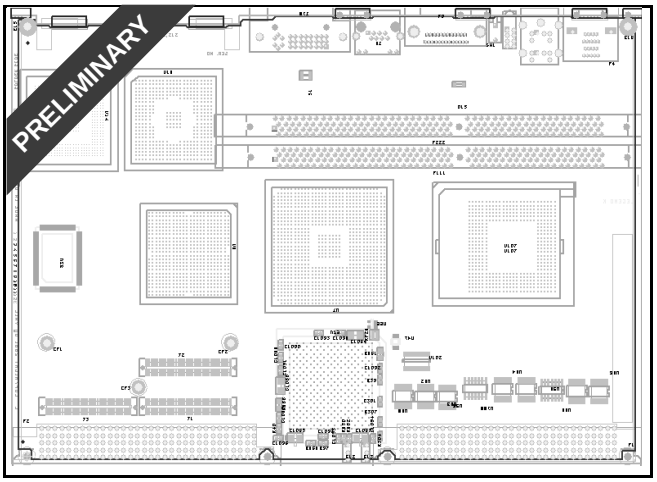
A GE Fanuc Company

VMIVME-7810
Intel® Pentium® M Processor-Based VMEbus SBC

- Dual-Slot VMEbus Single Board Computer (SBC)
- Intel® Pentium® M Processor, 478-pin mPGA
- Processor speeds up to 1.6GHz
- 1MB L2 Cache on-die
- Up to 4GB DDR1600 (200MHz) memory in 2 DIMMs
- New Microarchitecture supporting Micro-ops fusion, dedicated stack manager capabilities, and advanced instruction prediction capability.
- Intel® E7501 Chipset
- Reliability, Availability, Serviceability, Useability and Manageability (RASUM) features:
  - Supports S4EC/D4ED ECC and x4 chipkill ECC
  - Primary Hub Interfaces protected by ECC
  - Secondary Hub Interface protected by parity
- Streaming SIMD Extensions 2
- One 10/100 Ethernet Port
  - IEEE 802.3/802.3u
  - 100BASE-TX
  - IEEE 802.3x Full-Duplex Flow Control
  - 3KB TX/RX FIFO
- Two 10/100/1000 Ethernet Ports
  - IEEE 802.3 Ethernet interface for 1000Base-T, 100Base TX, and 10Base-T applications (802.3ab, 802.3u, 802.3)
  - 16KB TX FIFO, 48KB RX FIFO
  - IEEE 802.3 Ethernet interface for 1000Base-T, 100Base
- Dual-Channel SCSI Support
  - One Ultra320 channel available on front-panel
  - One single-ended channel available through P2 rear-panel connector.
  - Software RAID support
- Two 133/100/66-MHz PCI-X expansion sites (PMC form-factor)
- PCI graphics (32bit/66MHz) using ATI Mobility Radeon‘ M6 processor:
  - 16 Mbyte internal SGRAM
  - Video resolutions up to 1600 x 1200 x 16
  - Front-panel DVI-I connector providing analog video and digital flat-panel support.
- Two high-performance serial ports
  - DTE RS232 Support
  - 16550-compatible UART Operates Up To 1.5MBPS
  - Enhanced ESD Protection
- One enhanced parallel port
  - IEEE1284
  - EPP 1.7/1.9 Support
  - ECP Level 2 Support
- Two USB ports
  - USB Revision 1.1 compliant
- UltraDMA 100 IDE support out P2 rear-panel connector
- Up to 1G Byte on-board CompactFlash
- PS/2-style keyboard and mouse ports
- Real-time clock and miniature speaker
- VMIC’s suite of real-time support functions:
  - Two 32-bit programmable timers
  - Two 16-bit programmable timers
  - One programmable Watchdog timer
  - 32K Bytes NVRAM
- Passive heatsink solution
- Operating System Support
  - Windows 2000
  - Windows XP
  - Linux

APPLICATIONS

- Telecommunications
- Network Servers
- “Edge” switching/routing
- Simulation
- Imaging
- Supercomputer Clustering



Ordering Options								
Mar 26, 2003 SSS-007810-000	A	B	C	–	D	E	F	
VMIVME-7810	–				–			

A = Processor
- 0 = Reserved
- 1 = 1.1 GHz Pentium M Processor
- 2 = Reserved
- 3 = 1.6 GHz Pentium M Processor

B = SDRAM Memory
- 0 = Reserved
- 1 = 512 Mbyte
- 2 = 1 Gbyte
- 3 = 2 Gbyte
- 4 = 4 Gbyte

C = CompactFlash
- 0 = No CompactFlash
- 1 = 128 Mbyte CompactFlash
- 2 = 256 Mbyte CompactFlash
- 3 = 512 Mbyte CompactFlash
- 4 = 1 Gbyte CompactFlash

Connector Adapter

VMIC Part Number 360-010050-01. The connector adapter is a 9-pin Micro-D to standard D serial adapter. The 360-010050-001 connector adapter is sold separately.

For Ordering Information, Call:
1-800-322-3616 or 1-256-880-0444 • FAX (256) 882-0859
E-mail: info@vmic.com Web Address: www.vmic.com

DESCRIPTION – The VMIVME-7810 brings the power of the Intel® Pentium® M processor coupled with Dual Data Rate (DDR) SDRAM memory, Gigabit Ethernet and the high-speed PCI-X internal bus to provide the highest level of data processing and handling capabilities the VME form-factor. The two PMC expansion sites utilize the PCI-X bus to provide higher I/O bandwidth than previously available in a VME CPU. The higher-speed PCI-X bus provides up to 1GB/s bandwidth to support faster I/O devices such as Fiber Channel, Gigabit Ethernet, SCSI, Reflective Memory, and InfiniBand.

MICROPROCESSOR – The VMIVME-7810 supports the Intel® Pentium® M processor. The Pentium® M processor provides the higher levels of performance in an Intel Architecture (IA-32) processor through the use of 1MB L2 Advanced Transfer Cache and a new, re-designed microarchitecture. This new microarchitecture features higher clock speeds, a 400MHz Front-Side Bus (FSB), Micro-ops fusion, dedicated stack manager capabilities, and advanced instruction prediction capability. These features are incorporated specifically to increase performance and throughput while reducing power demands. These features are critical to providing increased processing power in power-limited environments like the VMEbus.

The following list provides some of the key features on the Intel® Pentium® M processor:

- Supports Intel® Architecture with Dynamic Execution
- High performance, low-power core
- On-die, primary 32-kbyte instruction cache and 32-kbyte write-back data cache
- On-die, 1-MByte second level cache with Advanced Transfer Cache Architecture
- Advanced Branch Prediction and Data Prefetch Logic
- ••Streaming SIMD Extensions 2 (SSE2)
- 400-MHz, Source-Synchronous processor system bus

400 MHz System Bus - The Intel® Pentium® M processor's 400-MHz processor system bus utilizes a split-transaction, deferred reply protocol. The 400-MHz processor system bus uses Source-Synchronous Transfer (SST) of address and data to improve performance by transferring data four times per bus clock (4X data transfer rate, as in AGP 4X). Along with the 4X data bus, the address bus can deliver addresses two times per bus clock and is referred to as a "double-clocked" or 2X address bus. Working together, the 4X data bus and 2X address bus provide a data bus bandwidth of up to 3.2 Gbytes/second.

Level 1 Execution Trace Cache – The Pentium M processor more than doubles the L1 cache of previous Intel processors, offering a 32 KB data cache and a 32 KB instruction cache. The processor also features a very advanced branch prediction architecture that significantly reduces the number of mispredicted branches. The result is a means to deliver a high volume of instructions to the processor's execution units.

Level 2 Advanced Transfer Cache - The Pentium® M processor offers 1MByte L2 Advanced Transfer Cache (ATC). The processor's Data Prefetch Logic speculatively fetches data to the L2 cache before an L1 cache requests occurs, resulting in reduced bus cycle penalties and improved performance.

Higher Core Frequencies – The new Pentium® M microarchitecture allows for higher core frequencies allowing for significant increases in the performance and scalability of the processor.

Streaming SIMD Extensions 2 (SSE2) -With the introduction of SSE2, the Intel® NetBurst™ microarchitecture now extends the SIMD capabilities that MMX technology and SSE technology delivered by adding 144 new instructions. These instructions include 128-bit SIMD integer arithmetic and 128-bit SIMD double-precision floating-point operations. These new instructions reduce the overall number of instructions required to execute a particular program task and as a result can contribute to an overall performance increase. They accelerate a broad range of applications, including video, speech, and image, photo processing, encryption, financial, engineering and scientific applications.

The processor maintains support for MMX™ technology and Internet Streaming SIMD instructions and full compatibility with IA-32 software. The high performance core features architectural innovations like Micro-op Fusion and Advanced Stack Management that reduce the number of micro-ops handled by the processor. This results in more efficient scheduling and better performance at lower power.

The Streaming SIMD Extensions 2 (SSE2) enable break-through levels of performance in multimedia applications including 3-D graphics, video decoding/encoding, and speech recognition. The new packed double-precision floating-point instructions enhance performance for applications that require greater range and precision, including scientific and engineering applications and advanced 3-D geometry techniques, such as ray tracing.

E7501 CHIPSET – The VMIVME-7810 uses the latest Intel® E7501 chipset designed to deliver maximized system bus, memory, and I/O bandwidth to enhance performance, scalability, and end-user productivity. The Intel E7501 chipset utilizes a modular design and offers platform implementation flexibility to meet the expanding needs of high-end processors through three core components: The Memory Controller Hub (MCH), the 64-bit PCI/PCI-X Controller Hub 2 (P64H2), and I/O Controller Hub 3-S (ICH3-S).

Memory Controller Hub (MCH) – The MCH is the central hub for all data passing through core system elements such as the processors the system bus interface, the memory via memory interface, and both the 64-bit PCI/PCI-X and

I/O controller hubs via Intel® Hub Interfaces. The Intel® E7501 chipset delivers compelling performance at 3.2 Gbyte/s of bandwidth across the 400 MHz system bus and up to 3.2 Gbyte/s of bandwidth across two high-performance Double Data Rate SDRAM memory channels. To balance the performance offered by the processor and memory interfaces, the MCH allows several high-bandwidth I/O configuration options for a total of 3.2 Gbyte/s of I/O bandwidth. Together, these features deliver balanced, high-throughput system performance for dual processor server platforms.

64-bit PCI/PCI-X Controller Hub 2 (P64H2) – The P64H2 connects to the MCH through a point-to-point Hub Interface 2.0 connection. In the VMIVME-7810, three P64H2 devices are attached to the MCH, each providing an I/O bandwidth greater than 1 Gbyte/s for a total of 3.2 Gbyte/s of I/O bandwidth. Each P64H2 contains two independent 64-bit PCI-X for a total of six independent 64-bit PCI-X busses. The VMIVME-7810 uses these PCI-X busses to provide the highest throughput available to the built-in dual gigabit ethernet ports, and the four PMC sites.

I/O Controller Hub 3-S (ICH3-S) – The ICH3-S connects to the MCH through a point-to-point Hub Interface 1.5 connection. The ICH3-S provides legacy I/O interfaces through integrated features including a two-channel Ultra ATA/100 bus master IDE controller and three USB controllers. The ICH3-S also offers an integrated System Manageability Bus 2.0 (SMBus 2.0) controller, an integrated 10/100 ethernet controller and a PCI 2.2-compliant interface (used to access the video interface for the VMIVME-7810).

DDR SDRAM – The VMIVME-7810 supports PC1600 registered Dual Data Rate (DDR) SDRAM and can accommodate two low-profile (1.2" or less) 184-pin DIMMS that allow up to 4 Gbyte total memory. Data transfers to and from the SDRAM on every clock edge at a 200 MHz rate for an overall transfer rate of 3.2 Gbyte/s.

10/100 Ethernet Controller – The VMIVME-7810 has a single 10/100 Ethernet controller that is integrated into the E7501 chipset's I/O controller hub (ICH) and utilizes an RJ-45 connector located on the front panel. The controller supports an interface fully compliant with the IEEE 802.3/802.3u standard including the Auto-Negotiation (and 100BaseTX) standard and the IEEE 802.3x Full-Duplex Flow Control standard. The controller features enhanced scatter-gather bus mastering capabilities which allows the LAN controller to perform high-speed data transfers over the PCI bus. The bus mastering capabilities enable the LAN controller to process high-level commands and perform multiple operations, thereby offloading communications tasks from the system CPU. Two large transmit and receive FIFOs (3 kbytes each) are also included in the architecture to enhance performance while minimizing the use of system resources.

10/100/1000 Ethernet Controller – The VMIVME-7810 has dual 10/100/1000 "Gigabit" Ethernet controllers. The dual Gigabit Ethernet controllers are discrete devices connected to the chipset via private PCI-X bus segments, allowing for maximum data transfer rates of 1 Gbyte/s between the processors and ethernet controllers. The Gigabit Ethernet controllers utilize dual RJ-45 connectors located on the front panel and provides an interface to the host processors by using on-chip command and status registers and a shared host-memory area. The controller's descriptor ring management architecture is optimized to deliver both high performance and PCI-X bus efficiency. Using hardware acceleration, the controllers can offload various tasks from the host processor, such as TCP/UDP/ IP checksum calculations and TCP segmentation. The Gigabit Ethernet controllers cache up to 64 packet descriptors in a single burst for efficient PCI-bandwidth usage while the large 64 kbyte on-chip packet buffer maintains superior performance as available PCI bandwidth descriptors change. Fully integrated physical-layer circuitry provides a standard IEEE 802.3 Ethernet interface for 1000BaseT, 100BaseTX, and 10BaseT applications (802.3ab, 802.3u, 802.3).

Dual-Channel Ultra320 SCSI – An on-board PCI-X Ultra320 SCSI controller provides two independent SCSI channels. Both differential channels are capable of transferring data at up to 320 Mbyte/s. Connection to the SCSI bus is provided through two high-density connectors on the front panel. For applications requiring connection through the backplane, one channel is routed through the user-defined VMEbus and supports single-ended SCSI-2.

"PCI-X on PMC" Expansion Sites – The VMIVME-7810 is the industry's first VMEbus board to incorporate PMC expansion sites that support the PCI-X bus. Each PMC site is on a private PCI-X bus segment allowing for maximum data transfer rates of 1GB/s between the processors and the PMC device. Each PMC site is fully backward compatible with legacy 32-bit/33MHz and 64-bit/66MHz PMCs with 5V/3V signaling.

Super VGA Controller – The VMIVME-7810 offers an integrated high-performance 3D super VGA (SVGA) controller, the ATI Mobility Radeon, that supports high-resolution graphics and multimedia-quality video, with 16 Mbytes of SGRAM. The SVGA controller is on a private 66 MHz PCI bus allowing for maximum data transfer rates of 264 Mbyte/s. Video resolutions supported by the graphics adapter are shown in the following table.

Table 1. Video Resolutions Supported

Screen Resolution	Colors (bpp)*	Refresh Rate (Hz)
640 x 480		
800 x 600		
1,024 x 768		
1,280 x 1,024		
1,600 x 1,200		

*bpp – Bits Per Pixel

1. May exhibit objectionable ghosting.

Digital Visual Interface (DVI) — The VMIVME-7810 has a Digital Visual Interface that provides a high-speed digital connection for visual data types that are display technology independent. DVI is a display interface

developed in response to the proliferation of digital flat-panel displays. For the most part, these displays are currently connected to an analog Video Graphics Array (VGA) interface and, thus, require a double conversion. The digital signal from the computer must be converted to an analog signal for the analog VGA interface, then converted back to a digital signal for processing by the flat-panel display. This inherently inefficient process takes a toll on performance and video quality and adds cost. In contrast, when a flat-panel display is connected to a digital interface, no digital-to-analog conversion is required.

DVI uses Silicon Image's PanelLink, a high-speed serial interface that uses Transition Minimized Differential Signaling (TMDS) to send data to the monitor. The DFP and VESA Plug and Display interfaces also use PanelLink. For this reason, DVI can work with these previous interfaces by using adapter cables (depending on the signal quality of the adapter.) TMDS conveys data by transitioning between "on" and "off" states. An advanced encoding algorithm that uses Boolean exclusive OR (XOR) or exclusive NOR (XNOR) operations is applied to minimize the transitions. Minimizing transitions avoids excessive electromagnetic interference (EMI) levels on the cable. An additional operation is performed to balance the DC signal.

DVI also supports the VESA Display Data Channel (DDC) and the Extended Display Identification Data (EDID) specifications. DDC is a standard communications channel between the display adapter and monitor. EDID is a standard data format containing monitor information such as vendor information, monitor timing, maximum image size, and color characteristics. EDID information is stored in the display and is communicated over the DDC. EDID and DDC enable the system, display and graphics adapter to communicate so that the system can be configured to support specific features available in the display.

DVI Connectors — The digital DVI connector has 24 pins that can accommodate up to two TMDS links and the VESA DDC and EDID services. The DVI specification defines two types of connectors:

- DVI-Digital (DVI-D) supports digital displays only
- DVI-Integrated (DVI-I) supports digital displays and is backward compatible with analog displays

Figure 1 compares the 24-pin DVI-D and the 15-pin legacy VGA receptacle connector.

Figure 1. VGA and DVI-D Connectors

The DVI-D interface is designed for a 12- or 24-pin DVI plug connector from a digital flat panel. (Single-link DVI plug connectors implement only 12 of the 24 pins. Dual-link connectors implement all 24 pins.) The DVI-I interface accommodates a 12- or 24-pin DVI plug connector or a new type of analog plug connector that uses four additional pins, plus a ground plane plug to maintain a constant impedance for the analog RGB signals. The optional DVI-I interface is available from VMIC (VMIC P/N 321-000455-000 for the DVI-I adapter).

Serial Ports – The VMIVME-7810 offers two RS232 serial ports controlled by 16550-compatible UARTS. Each port has an independent 16-byte FIFO to support baud rates up to 115 kbps. The serial ports provide enhanced ESD protection for:

- ±15kV, Human Body Model
- ±8kV, IEC1000-4-2, Contact Discharge
- ±15kV, IEC1000-4-2, Air-Gap Discharge

The serial ports are accessible via two DB9 male connectors located on the front panel.

CompactFlash — The VMIVME-7810 includes a CompactFlash socket on the assembly. The CompactFlash may be configured as the boot device through the BIOS boot device set up. The CompactFlash, as an ordering option is available up to 1 Gbyte of storage space.

Parallel Port – The VMIVME-7810 offers a single enhanced parallel port. The parallel port is IEEE1284 compliant and supports EPP 1.7/1.9 and ECP Level 2 standards. The parallel port is accessible via an µDB25 connector located on the front panel. A cable is available to adapt the µDB25 connector to a standard DB25 female connector (VMIC P/N 360-010051-000).

USB Port – The VMIVME-7810 offers two USB ports compliant with the USB 2.0 specification. The USB ports are accessible via USB connectors located on the front panel.

Keyboard/Mouse Ports – The VMIVME-7810 supports a standard PS/2 keyboard and mouse. The keyboard and mouse ports are accessible using a single 6-pin mini DIN connectors located on the front panel.

Programmable Timer — The VMIVME-7810 provides the user with four 32-bit timers and one 32-bit watchdog timer. These timers are software programmable and can generate Non-Maskable Interrupts (NMI). The timers can be also be combined to make 64-bit timers.

Watchdog Timer — The VMIVME-7810 provides a software-programmable watchdog timer. The watchdog timer is enabled under software control. Once the timer is enabled, on-board software must access the timer within the specified time period, or the output of the watchdog timer will reset the VMIVME-7810. The watchdog timer can be jumper configured to cause a reset, Independent of the jumper, software can enable the watchdog timeout to cause a non-maskable interrupt (NMI).

Nonvolatile SRAM — The VMIVME-7810 provides 32 Kbyte of nonvolatile SRAM. The contents of the SRAM are preserved when +5 V power is interrupted or removed from the unit.

Reset Switch and Annunciators — A push-button switch located on the front panel is used to reset the VMIVME-7810. Indicators on the front panel include: +5 V power good, IDE activity, board status, LAN activity and LAN mode are provided .

VMEbus Interface — The VMIVME-7810 VMEbus interface is based on the Universe IID high-performance PCI-to-VMEbus interface from Newbridge/Tundra. The following VME64 modes are supported: A32/A24/D32/D16/D08(EO)/MBLT64/BLT32.

Operating System and Software Support — The VMIVME-7810 supports a variety of operating systems including Microsoft Windows NT, Windows 2000, WindowsXP, QNX, Linux and VxWorks Tornado/AE BSPs. The BSP provides support for the VMEbus interface, Ethernet and timers.

SPECIFICATIONS

Dual-Slot 6U (8HP) Eurocard Form Factor:

Height 9.2 in. (233.4 mm)

Depth 6.3 in. (160 mm)

Thickness 1.6 in. (40.6 mm)

Power Requirements —

+5 VDC (±5 percent), TBD A typ, TBD Amp maximum

+12 VDC (±5 percent), TBD mA typ, TBD mA maximum

-12 VDC ±5 percent), TBD mA typ, TBD mA maximum

NOTE: The currents at +12 and -12 VDC are specified with the serial connectors open.

PMC Expansion Site Connector —

3.3 V signalling, auto-VIO

64-bit PCI-X bus, 133 MHz maximum

(Backward comatible to 3 V 33 MHZ PCI)

Environmental Conditions

Airflow:

Heatsink with Forced air cooling required: <TBD> LFM minimum

Temperature:

Operating: 0 to +40 °C

Storage : -40 to +80 °C

Altitude:

Operating: 0 – 10,000 ft (3,000m)

Storage: 0 – 40,000 ft (12,000m)

Humidity:

Operating, Relative Humidity 10 to 90% non-condensing

Storage, Relative Humidity 10 to 90% non-condensing

TRADEMARKS

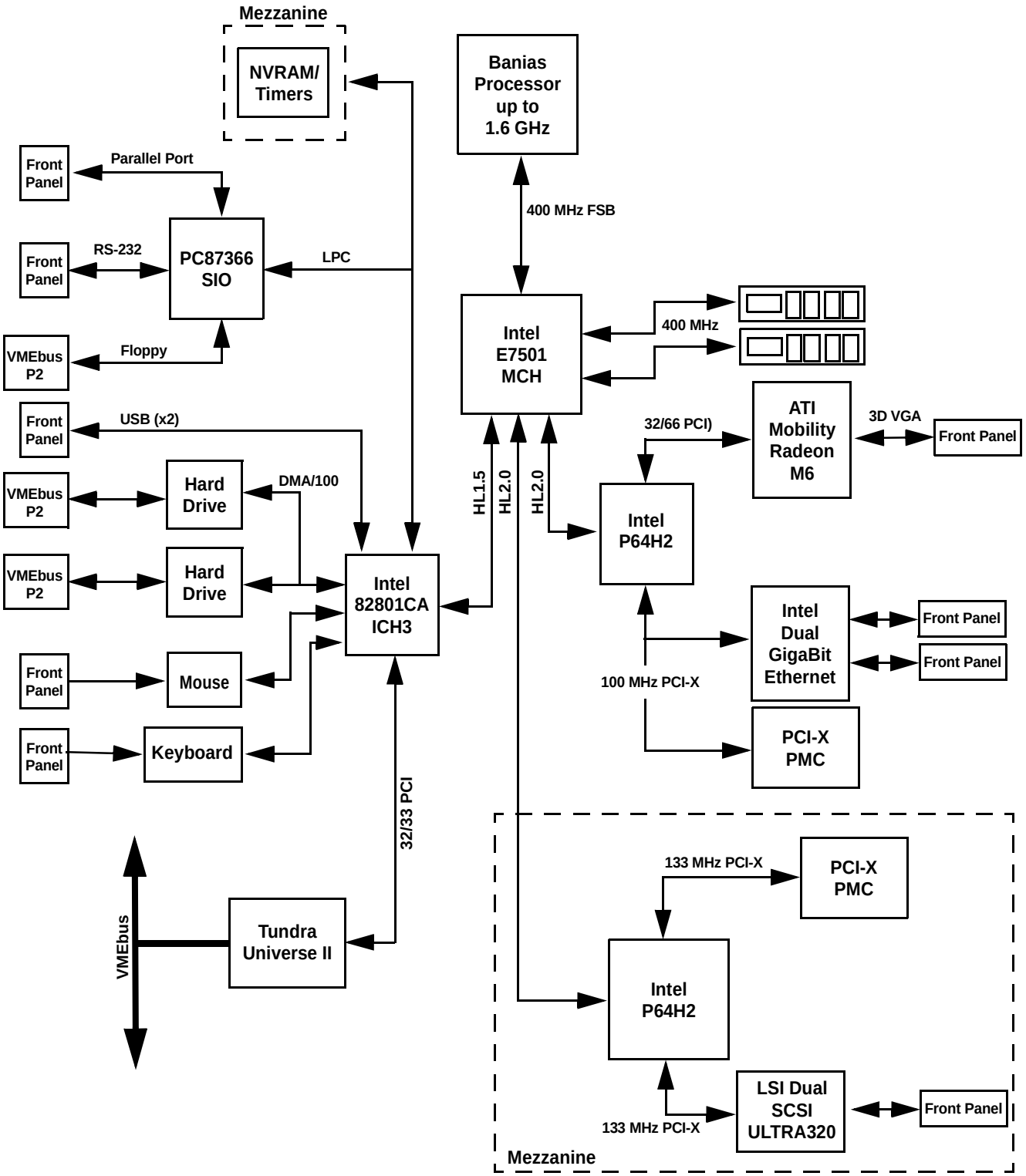


Figure 1. VMIVME-7810 Block Diagram