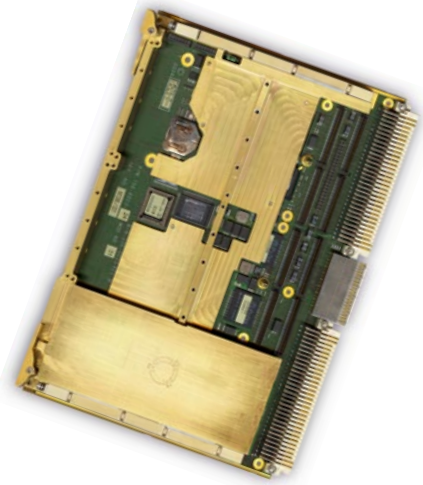
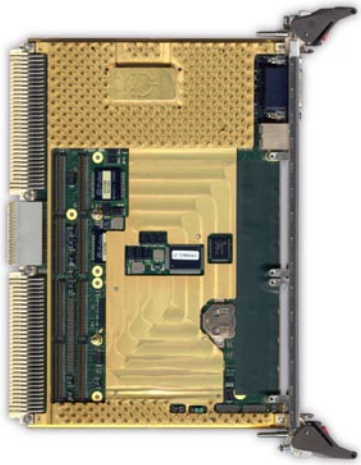
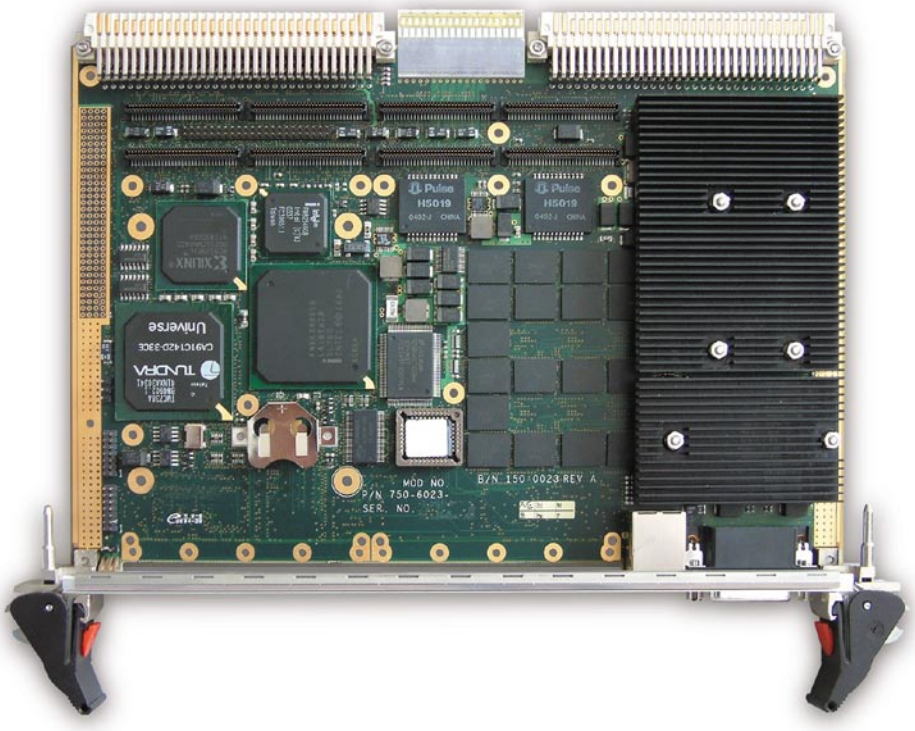
# PENTXM

## Low-Power Pentium® M VME Blade PC







WINDLINK™ PARTNER

LYNUXWORKS

- 1.6 or 1.8 GHz Pentium® M Processor
- Low-Power Intel® 855GME Host Bridge
- Two 64-bit/66 MHz PMC Slots
- Direct Memory Access (DMA) Graphics Controller
- Available in Four Ruggedization Levels

kontron

## Product Overview

The PENTXM is a PC-compatible high-performance, high-functionality VMEbus processor board utilizing the 1.6 GHz or 1.8 GHz Intel Pentium M. The single-slot board features 2 PMC sites, 1 GB of soldered synchronous SDRAM and a variety of interfaces including an option for an onboard hard disk drive, CompactFlash™ or IBM®/Hitachi MicroDrive™.

The PENTXM is suitable for a range of demanding embedded applications within the industrial control, telecommunications, telemetry, scientific, and aerospace markets. Popular industry-standard operating systems are supported to simplify integration.

- 1.8 GHz Pentium M processor 745
  - 64 KB L1 Cache
  - 2 MB L2 Cache
  - No CPU Fan Needed

or

- 1.6 GHz Pentium M processor
  - 64 KB L1 Cache
  - 1 MB L2 Cache
  - No CPU Fan Needed
- Low-Power Intel 855GME Host Bridge
- 1 GB 266 MHz DDR ECC SDRAM
- High-Performance EIDE Interfaces with Optional Onboard Disk Drive or Optional CompactFlash or MicroDrive (In a Single Slot)
- Two 64-bit/66 MHz PMC Interfaces
- PMC Expansion Board Available for Two or More Additional PMC Sites
- Intel 6300ESB I/O Controller Hub
- Two 10/100/1000BASE-T Ethernet Interfaces
- VME64 Interface
- Packet Switching Backplane (VITA 31.1)
- 64 MB Application Flash EPROM
- 512 KB BIOS Flash EPROM
- High-Resolution Graphics Interface
- Keyboard and Mouse Interface
- Up to 3 Serial Channel Interfaces
- Up to 2 USB Interfaces
- Watchdog Timer
- Long Duration Timer
- PMC I/O Carrier Boards Available
- OS Support of VxWorks, Linux, and Windows XP
- Available in Convection- and Conduction-Cooled Versions

### Pentium M Processor

The PENTXM uses the low-power first-generation 1.6 GHz Pentium M processor or the 1.8 GHz Pentium M processor 745. Both feature 64 kB of primary on-die cache and a 400 MHz Front Side Bus (FSB). The on-die secondary cache is 1 MB on the 1.6 GHz Pentium M processor and 2 MB on the 1.8 GHz Pentium M Processor 745. Both are low power dissipating processors, thus they do not need a CPU fan. The Intel Pentium M processor is upwardly code-compatible with the other members of the x86 family of microprocessors. The processor has a built-in floating point coprocessor for compatibility with 486 and 386/387 designs. Utilizing the 64-bit Intel 855GME host bridge, the Pentium M supports a 400 MHz bus frequency.

A JTAG-compatible debug port on the Pentium M is accessible via the optional In-Target Probe (ITP) 26-pin connector. The Intel Thermal Monitor allows system designers to lower the cost of thermal solutions without compromising system integrity. By using a factory-tuned on-die temperature sensor and a fast-acting thermal control circuit (TCC), the Pentium M processor, without the aid of any additional software or hardware, can restrict its die temperature to remain within factory specifications under typical realworld operating conditions.

### Processor Clock Frequency

Depending on the build option, the processor is able to be clocked at up to 1.6 GHz or 1.8 GHz. The onboard BIOS allows the customer to either fix the clock rate of the processor to a defined value or let the processor determine its frequency according to the die temperature. By default on the commercial versions, the CPU-controlled timing mode is set. In extended-temperature versions, WA or the rugged air-cooled and conduction-cooled versions, the core frequency is locked on a fixed value which allows the card to work without damage over the whole temperature range. Nevertheless, such a frequency mode can be changed by the user. The factory default clock frequency for rugged versions is 1.2 GHz.

### System Memory

1 GB of 266 MHz DDR ECC SDRAM is soldered on the board and is accessible from the processor on the VMEbus. Double-bit error detection and single-bit error correction are supported.

The PENTXM has 64 MB application Flash EPROM and 512 KB BIOS Flash EPROM.

### EIDE Hard Disk Interfaces

Two EIDE hard disk interfaces support up to Ultra DMA 100 for highperformance drives. The primary channel, accessible via P2, connects to an optional hard/floppy/flash/CD-ROM drive board. The secondary channel can be used for an onboard disk drive or dual CompactFlash or a MicroDrive Type II drive carrier.

**PMC Interface**
The PCI bus is a 3.3V signalling only, 33/66 MHz, 32/64-bit bus that meets the requirements for PCI specification, revision 2.2. The PENTXM supports two PMC sites. Front panel I/O is available for both sites, via P2 for PMC #1 and optionally via P0 for PMC #2. Expansion to an optional dual PMC carrier board is available using a 32-bit 33 MHz expansion connector or one of the 64-bit 66 MHz PMC sites.

**VME Interface**
Implemented using the Tundra® UniverseII™ device, the VME interface provides fast hardware byte swapping as well as full interrupter/interrupt handler support. The interface automatically detects the system controller and allows the PENTXM to function as a VME master or slave.

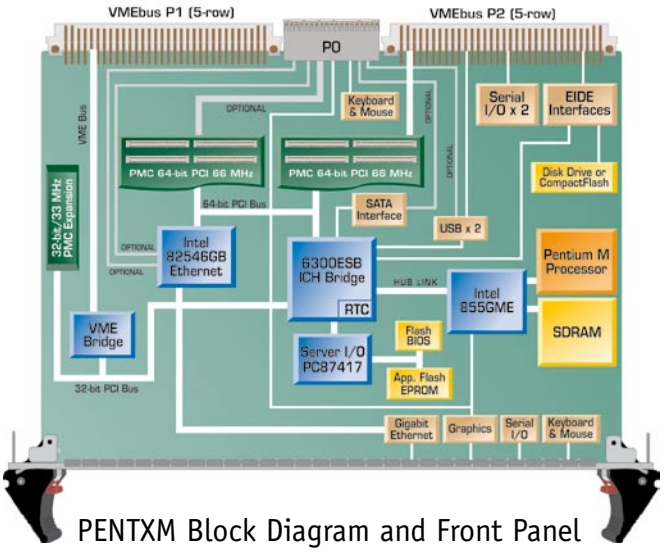
**Ethernet**
Two 10/100/1000BASE-T Ethernet channels are implemented by the Intel 82546GB LAN Controller via the 64-bit PCI bus. One Ethernet channel may be routed to the front panel RJ-45. VITA 31.1 Gigabit Ethernet for VME backplanes is supported.

**Serial Interface**
The PENTXM has up to three 16550-compatible UART serial channel interfaces. One EIA-232 serial port is accessible on the front panel via a 26-pin high-density connector. Two EIA-232/422/485 serial ports are accessible from the rear panel via P2.

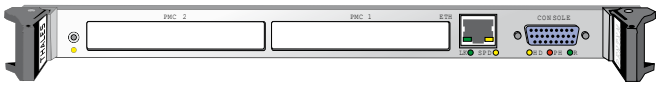
**I/O Controller Hub**
The Intel 6300ESB I/O Controller Hub features low power dissipation and provides port 60/64 emulation, a two-stage watchdog timer, GPIOs, as well as two of the PENTXM's three UARTs. In addition, an LPC interface is provided for the Firmware Hub.

**Graphics Interface**
The Intel 855GME host bridge provides resolutions up to 2048 x 1536 @ 75 Hz and up to 16M colors. The graphics interface is accessed via a 26-pin high-density front-panel connector. As an alternate, analog graphics are switchselectable to P0.

**Additional Interfaces**
The PENTXM supports up to two USB 2.0 ports. A PC-compatible Real-Time Clock (RTC) is supported as well as a watchdog timer and a 32-bit Long Duration Timer with processor interrupt capability. Front-panel access to keyboard and mouse interfaces is supported with alternate access via P0.



PENTXM Block Diagram and Front Panel



**Phoenix BIOS**
The Phoenix ServerBIOS™ 3 is provided with the PENTXM board. The BIOS contains a comprehensive Power-On Self-Test (POST), and LAN boot firmware is included. With the BIOS Setup Program you can modify BIOS settings and control the special features using options menus.

**Board Support Packages**
BSPs are available for VxWorks, Linux, Windows XP and Windows 2000.

**Built in Test Option**
Kontron diagnostics tools for Pentium-based SBCs provide a comprehensive set of Built-In Test (BIT) routines to verify the integrity of the underlying hardware. Designed for use with mission-critical software with hard real-time constraints, they simplify integration with applications running COTS software.
Three test set definitions are available in Flash: cold start, warm start, and forced start. These definitions can be tailored to achieve the appropriate test coverage/ starting run time ratio. The Kontron Power-on BIT (PBIT) routines run automatically at power-on, and the test results are stored in onboard Flash memory for later use by the operating system or application.
Order Code : PBIT-PENTXM

# Technical Information

## Rear Panel Connections

### P0 Build Options

Two P0 build options are available on the PENTXM.

**Build Option I/O routing on P0 & P2 type 1:**

- Ethernet channel 0
- PMC site 2 I/O signals P24 1-64
- Keyboard and mouse
- Analog graphics
- GPIO1

**Build Option I/O routing on P0 & P2 type 2:**

- Ethernet channel 0
- Ethernet channel 1
- USB channel 2
- PMC site 2 I/O signals P24 33-64
- Keyboard and mouse
- Analog graphics
- GPIO1
- GPIO2

### P2 I/O Connections

The following I/O connections are routed to P2 on the PENTXM:

- EIDE Bus
- Two serial ports
- PMC site 1 I/O signals P14 1-64
- One USB 2.0 channel

### Product Warranty and Services

- All of Kontrons' hardware products are covered by a two-year return-to-factory warranty.
- Several service programs are available, including update services, hotline access, product repair and exchange services, and online, remote, or on-site technical assistance.

Finally, in addition to its standard support services, Kontron offers customized consultation to system integrators.

### Miscellaneous

- Board size: VME double Eurocard (6U: 233.3 mm x 160 mm)
- Single VME slot
- All Kontron boards are EC-compliant.
- Conduction-cooled version of the PENTXM is IEEE 1101.2-1992-compliant.

## Add-Ons & Accessories

### Paddle Boards

A variety of paddle boards providing P2 and P0 backplane breakout are available for the PENTXM.

**VITA 36 Paddle Board, I/O routing on P0 & P2 type 1 (PBV36-P0-PXM00-01):**

- 40-pin IDC EIDE header
- High-density 26-pin connector for keyboard, mouse, analog graphics, and one serial port
- One USB 2.0 connector
- RJ-45 Ethernet connector
- Two PIM locations
- One 10-pin IDC header for the second serial port (EIA-232/422/485)
- Header for a GPIO signal
- VITA 36-compatible

**VITA 36 Paddle Board, I/O routing on P0 & P2 type 2 (PBV36-P0-PXM00-02):**

- 40-pin IDC EIDE header
- High-density 26-pin connector for keyboard, mouse, analog graphics, and one serial port
- Two USB 2.0 connectors
- Two RJ-45 Ethernet connectors
- One PIM location
- One 10-pin IDC header for the second serial port (EIA-232/422/485)
- Header for two GPIO signals
- VITA 36-compatible

**AD VP2/011-10, I/O routing on P0 & P2 type 1:**

- 40-pin IDC EIDE header
- PS/2 combined keyboard and mouse connector
- One USB 2.0 connector
- RJ-45 Ethernet connector
- VGA connector
- Two 68-pin sockets for PMC I/O
- Two 10-pin IDC header for serial ports (EIA-232/422/485)
- Headers for GPIO

**AD VP2/012-10, I/O routing on P0 & P2 type 2:**

- 40-pin IDC EIDE header
- PS/2 combined keyboard and mouse connector
- One USB 2.0 connector
- Two RJ-45 Ethernet connectors
- VGA connector
- One 68-pin socket for PMC I/O
- 34-pin IDC header for PMC2
- Two 10-pin IDC header for serial ports (EIA-232/422/485)
- Headers for GPIO

### Other Add-Ons & Accessories

**AD CR2/PMC 01**
PMC Carrier for PENTXM with P0; Supports two single-width 32-bit PMCs; 5V and 3.3V PCI signaling.

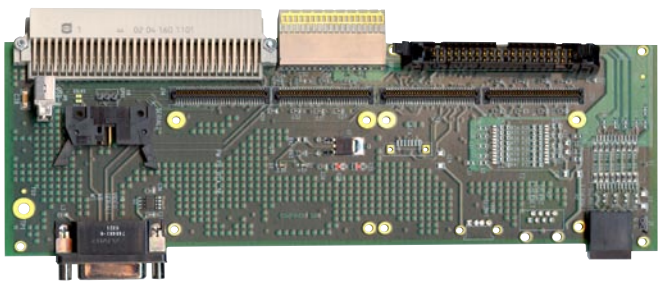
**AD CR2/PMC 10**
PMC Carrier for PENTXM without P0; Supports two single-width 32-bit PMCs; 5V and 3.3V PCI signaling.

**CFD-1024-00**
1 GB CompactFlash Disk.

**AD 200/001-01 Dual**
CompactFlash carrier module for PENTXM; Provides two CompactFlash sites which also support the IBM/Hitachi MicroDrive hard disks; Uses one PMC slot; Kit includes cable and applicable hardware.

**ICHD-PENTXM040**
40 GB, 2.5" EIDE Disk Drive; Uses one PMC slot; Kit includes cable and applicable hardware.

**CB 26D/124-00**
Serial line, VGA, keyboard, mouse, breakout cable for PENTXM.



PBV36-P0-PXM00-01

# Technical Information

| CPU | |
|---|---|
| 1.6 GHz Pentium M Processor or 1.8 GHz Pentium M Processor 745 | |
| Support Chip Sets | |
| Graphics & Memory Controller | Intel 855GME |
| I/O Hub | Intel 6300ESB |
| PCI-VME | Tundra Universe II |
| **Memory** | |
| SDRAM | 1 GB |
| Cache | 64 KB Primary, 1 MB Secondary |
| Flash EPROM | 512 KB of BIOS |
| Application Flash | 64 MB |

**Standard Compliance**

- PCI Specification, Rev 2.2
- VITA 20-200x, CCPMC Draft Standard, Draft 1.15
- VITA 36-199x, PMC I/O Module Draft Standard, Draft 0.1
- IEEE P1386 Common Mezzanine Card Family: CMC
- IEEE P1386.1 Physical/Environmental Layer for PMCs
- IEEE 1101.2-1992 Mechanical Core Specifications for Conduction-Cooled Eurocards

| VMEbus | |
|---|---|
| Interface | A32/A24/A16 D08 (EO)/D16/D16BLT D32/D64/D32BLT/D64BLT (MBLT) |
| Arbiter | 4-level priority or round robin arbiter and Auto-SYSCON |
| Requester | Fair, ROR, or RWD |
| **Miscellaneous** | |
| PMC Interface | 64-bit 66 MHz, 3.3V signaling only |
| Video | Up to 16M colors, 2048 x 1536 @ 75 Hz |
| Ethernet | Two 10/100/1000BASE-T channels |
| USB | One or two USB 2.0 interfaces |
| External IDE | Primary & secondary IDE interfaces |
| Serial Ports | Three: one EIA-232 and two EIA-232/422/485 |
| Keyboard & Mouse | PS/2 (with breakout cable) |
| Real-time Clock | DS1287-compatible/MC146818B |
| Voltage Requirements | +5V: 5A typical<br>+5V; +12V/-12V for PMC site only |
| Battery Backed Options | Onboard battery and/or 5V standby |

| Environmental Specifications | | | | |
|---|---|---|---|---|
| | **SA** Standard Commercial | **WA** Extended Temperature | **RA** Rugged Air-Cooled | **RC** Rugged Conduction-Cooled |
| Conformal Coating | Optional | Standard | Standard | Standard |
| Airflow 1.6 GHz | 1.2 m/s | - | 3.1 m/s | NA |
| 1.8 GHz | 1.2 m/s | - | - | NA |
| Temperature | VITA 47-Class AC1 | VITA 47-Class AC2 | VITA 47-Class AC3 | VITA 47-Class CC4 |
| Cooling Method | Convection | Convection | Convection | Conduction |
| Operating | 0° to +55°C | -20° to +65°C | -40° to +75°C | -40° to +85°C |
| Storage | -45° to +85°C | -45° to +85°C | -45° to +100°C | -45° to +100°C |
| Vibration Sine (Operating) | 20/500 Hz: 2g | 20/500 Hz: 2g | 20/2,000 Hz: 3g | 20/2,000 Hz: 5g |
| Random | VITA 47-Class V1 | VITA 47-Class V1 | VITA 47-Class V2 | VITA 47-Class V3 |
| Shock (Operating) | 20g/11 ms Half Sine | 20g/11 ms Half Sine | 40g/20 ms Half Sine | 40g/20 ms Half Sine |
| Altitude (Operating) | -1,640 to 15,000 ft | -1,640 to 33,000 ft | -1,640 to 33,000 ft | -1,640 to 50,000 ft |
| Relative Humidity | 90% without condensation | 95% without condensation | 95% without condensation | 95% without condensation |

## Ordering Information

| | | SA | WA | RA | RC | PENTXM- | | | | | 00 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Environnement Class | Standard (Air) | X | | | | SA | | | | | | | | |
| | Extended Temperature (Air) | | X | | | WA | | | | | | | | |
| | Rugged Convection-Cooled (Air) | | | * | | RA | | | | | | | | |
| | Rugged Conduction-Cooled | | | | X | RC | | | | | | | | |
| Processor | 1.6 GHz Pentium M | X | X | X | X | | 3 | | | | | | | |
| | 1.8 GHz Pentium M 745 | X | | | | | 4 | | | | | | | |
| SDRAM | 1.0 GB | X | X | X | X | | | 2 | | | | | | |
| Flash | 64MB | X | X | X | X | | | | 3 | | | | | |
| I/O Routing | on P0 & P2: Type 1 | X | X | X | X | | | | | 10 | | | | |
| | on P0 & P2: Type 2 | X | X | X | X | | | | | 20 | | | | |
| Reserved | | | | | | | | | | | 00 | | | |
| P0 Connector | Yes | X | X | X | X | | | | | | | 0 | | |
| | No | X | X | X | X | | | | | | | N | | |
| Coating | Default | | X | X | X | | | | | | | | | |
| | Option | X | | | | | | | | | | | V | |
| RoHS | Default on SA | X | | | | | | | | | | | | U |

Add code V only when not default

* Contact Kontron

With AFAQ ISO 9001 2000 Version Certification
Kontron Modular Computers S.A.
guarantees Total Customer Satisfaction

## Corporate Offices

**Europe, Middle East & Africa**
Oskar-von-Miller-Str. 1
85386 Eching/Munich
Germany
Tel.: +49 (0)8165/ 77 777
Fax: +49 (0)8165/ 77 219
sales@kontron.com

**North America**
14118 Stowe Drive
Poway, CA 92064-7147
USA
Tel.: +1 888 294 4558
Fax: +1 858 677 0898
sales@us.kontron.com

**Asia Pacific**
17 Building,Block #1,ABP.
188 Southern West 4th Ring Road
Beijing 100070,P.R.China
Tel.: + 86 10 63751188
Fax: + 86 10 83682438
kcn@kontron.cn

**Kontron Modular Computers S.A.**
150, Rue Marcelin Berthelot
ZI Toulon Est - BP 244
83078 Toulon Cedex 9 - France
Tel: +33 (0) 4 98 16 34 00
Fax: +33 (0) 4 98 16 34 01
sales@kontron.com

#PENTXM#1706200809DL
Copyright© 2008 Kontron AG. All rights reserved. All data is for information purposes only and not guaranteed for legal purposes. Information has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies.
Kontron and the Kontron logo and all other trademarks or registered trademarks are the property of their respective owners and are recognized. Specifications are subject to change without notice.