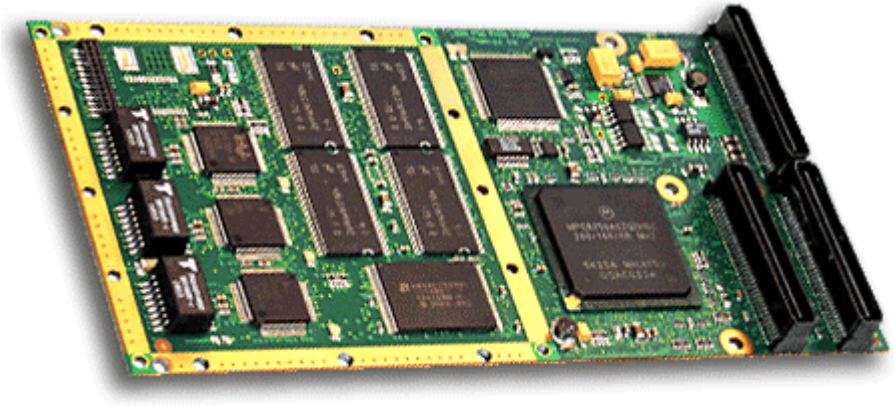
Systems By Design

# 8751 - Conduction Cooled PMC Single Board Computer with 3 10/100TX Auto-sensing Ethernet Controllers



The 8751 PMC is a highly integrated module with single board computer functionalities. This rugged PMC board is intended for embedded applications requiring conduction cooling. The board was designed in accordance with ANSI VITA 20 and IEEE1386.1 PCI mezzanine card standards. It features a high performance, 32-bit PowerPC processor with three Fast Ethernet controllers. It can be used in conjunction with CompactPCI, VME carriers or proprietary designs. Multiple networks or embedded can be addressed with this board:

- Processing requirements with a high level of integration and low power consumption
- Communication controller with Multiple Ethernet Links
- Ethernet channels with redundancy

## Description

The 8751 is powered by a MPC8250/70, part of the PowerQUICC II processor family. This embedded processor couples a 603e core with a RISC communication processor, and three Fast Ethernet controllers. The low 4W power design simplifies system integration.

The board implements a 64-bit PowerPC local bus. This local bus is used by the host via the 32-bit PCI bus through a PowerPC-to-PCI bridge.

The 8751 can be used in three different modes: Monarch, Non-Monarch or stand-alone and may be used as the host or node. Depending on the mode, it can act as the host processor. Three full-duplex 802.3 and Fast Ethernet controllers are provided in conjunction with three PHY 10/100TX interfaces. Each controller implements a local FIFO and DMA channel and supports the promiscuous mode.

Thermal management is supplied by temperature sensors. Surge protection implemented on each Ethernet lines make this board particularly suited to harsh, industrial environments. This board is offered standard with conformal coating.

Four multi-purpose serial controllers are provided (each with a data rate up to 10Mbits) on the Pn4 rear I/O or the reverse optional Pn3 connector. SPI and I²C bus are also available on these connectors.

In addition Pn3 provides several GPIO. An engineering kit is available to enable easy utilization of debug tools: JTAG/COP/Async RS232 port and external reset.

# 8751 Features

## Processor Core

• PPC603e with FPU 32 bit RISC architecture with:
• 266 or 400/450 MHz
• 16KB Instruction Cache and 16KB Data Cache
• 24KB on-Panel fast dual-port SRAM
• MMU and FPU capabilities
• DMA-channel controllers
• 64 or 128MB of shared SDRAM
• 128KB SRAM
• 8 or 32 MB of Nor Flash EPROM
• 32KB SPI EEPROM
• Real Time clock and four 32 bit-timers
• PCI interface Initiator, Target & Host:
• 32 bits @ 33/66 MHz
• 3.3V only PCI signaling Rev 2.2

## I/O subsystem

Up to three Ethernet 10/100TX auto-sensing ports are routed to the front panel RJ45 or Pn4 connector:

• On the rear I/O Pn4 and reverse Pn3 connectors
• 4*Multi-purpose serial controller SCC[1..4]
• 4 TDM with 128 HDLC channels
• I²C bus (400Kbs), SPI and one RS232 serial port
• On the reverse Pn3, several general logical I/O
• On the debug connector: JTAG/COP and SMC1

## Options

• 128 or 256MB soldered Flash Disk
• SDRAM with ECC extension
• Time of day Calendar clock
• Supercap for Cal. Clock and backup SRAM
• Reverse Pn3 to mezzanine Panel connection

## On-Panel Firmware

A comprehensive set of firmware is provided and stored in flash memory including:

### - Boot

This module is called by the reset vector when the Panel is powered up. It initializes the processor, the memory controller, the Bios module, and performs the Power on self-tests before initializing the PCI bridge and executing applications stored in memory.

### - Bios

This module allows the user to access the specific 8751 hardware resources via an easy-to-use API. A set of about 60 library functions is provided.

### - Tools

A firmware monitor allowing loading files from Ethernet via Bootp, running files in RAM or flash. The firmware monitor also permits display or modification of RAM data and allows for the performance of maintenance tests.

### - BSP basic

BSP products are based on the standard distribution of the OS editor. They manage hardware initialization, interrupt handling and generation, hardware clock and timer services, memory management, PCI management, mapping of memory spaces, basic serial for SMC/SCC (pseudo-driver for VxWorks®) and MAC driver for Fast Ethernet ports. The advanced CPM functionalities require specific protocol drivers.

### - Protocol Modules

Optimized drivers provided with new functions for serial controllers: asynchronous with frame, HDLC/SDLC, Bisync, Transparent mode, Ethernet, PPP, etc. Communication drivers are designed to minimize the buffer’s copy.

BSP provided for VxWorks® and Linux® operating systems. Other RTOS (LynxOS,...) can be ported on request. Powerful software debugging tools for application development are available for OS supported in-house. Hosts supported by the 8751 are Linux® OS and VxWorks.

# Board Specifications

**Environmental**

**MPC8250A** version: conduction cooled extended grade
**MPC8270** version: standard and rugged grade

## Physical dimensions

PMC Module single width, IEEE P1386 compliant (150 mm x 75 mm)

## Power requirements

3.3VDC only with less than 4 W for maximum configuration

**EM compatibility**

EMC/EMI: 89/336/ECC, EN55022 CE, EN50082-2

## Highlights

PowerPC embedded core

- 372 MIPS and 6,6SPEC95 @ 266MHZ (MPC8250)
- 630 MIPS and 11.5SPEC95 @ 450MHz (MPC8270)
- FPU, MMU, 16KB IC & 16KB ID
- 24 KB SRAM attached to core (MPC8250)
- 64 KB internal SRAM (MPC8270)

## SDRAM

64 or 128 MB 64-bits wide
Power management with self-refresh
Fast access 10ns (6.1.1.1)

## Flash or EEprom

8 MB or 32MB Mirror-NOR Flash
32KB of EEPROM on the SPI bus

## SRAM

128 KB

## DMA controller

4 virtual independent channels
8, 16, 32 bits peripheral support
Scatter/gather with command/data chaining
Transfers supported include: PCI, memory, internal I/O

## PCI interface

32-bit, 33/66MHz PCI version 2.2 compatible
Signalization 3.3VDC only
A poll of read and write buffers
PCI host bridge and peripheral capabilities
Monarch, Non-Monarch or stand-alone mode
4 independent DMA channels
I²O standard

## Ethernet Ports

Compliant with IEEE802.3, 802.3u, 802.3x
10/100Base TX auto-sensing
Surge protection

## Other on-Panel functions

**FOR MPC8250/70**

- Temperature sensor usable via the SPI bus
- I²C bus, SCC signals and multipurpose I/O on PMC I/O
- On-Panel DC/DC generation
- Optional calendar clock and supercap for backed up SRAM
- 4 multi-purposes serial controllers SCC configurable as:
- asynchronous or synchronous ports
- 10Mbs Ethernet channels
- TDM link at 2Mbs with 128 HDLC channels with TSA capability

These functionalities are provided without phy interface

## Only for MPC8270

USB on SCC4
Debug Ports via Engineering kit
RS232 serial link based on SMC UART
JTAG - COP

# Order Information

Conformal coating is included on this board
X = Extended temp

| | |
|---|---|
| **8751-1** | PowerQUICC II MPC8270@ 266MHz - 64MB SDRAM - 8MB Flash - 128KBSRAM - 32KB EEPROM - T° monitoring - 1*Ethernet 10/100TX (Rear I/O) PrPMC (monarch - non monarch) PCI 32bits 33/66MHz |
| **8751-2** | PowerQUICC II MPC8270@ 266MHz - 128MB SDRAM - 8MB Flash - 128KBSRAM - 32KB EEPROM - T° monitoring - 1*Ethernet 10/100TX (RB) PrPMC (monarch-non monarch) PCI 32bits 33/66MHz |
| **8751-Kit** | Engineering kit + User's Manual (HW & SW) + Console cable |
| **8751-SUP** | **Support is mandatory the first year of product purchasing. This package includes one full year of hardware, firmware and BSP software support; unlimited access to the technical team, and software releases as the arise during that year.** |
| **8751-V/BSP** | BSP / VxWorks v5.x / Tornado II Binary code. One-time fee, unlimited copies (per project) |
| **8751-L/BSP** | BSP / Linux v2.4.x Source & binary codes. One-time fee, unlimited copies (per project). CD includes the Linux interface to the board, Linux basic drivers in source for a cross development solution (per project). |

760 Veterans Circle Warminster, PA 18974 - Tel (215) 956-1200 - Fax (215) 956-1201

www.acttechnico.com