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PRODUCT DATASHEET



PMC-106

PowerPC 7447A Processor PMC Card



Features

- FreeScale PowerPC 7447A up to 1.0 GHz
- 64 Kbyte L1 and 512 Kbyte L2 internal caches
- VITA-32 Processor PMC supporting Monarch and Non-Monarch modes
- VITA-39 PMC-X capab le 64-bit interface up to 133 MHz
- Up to 512 Mbytes ECC protected DDR SDRAM
- 64 Mbytes Flash memory
- 8 Kbytes ferroelectric memory (FeRAM)
- Marvell DiscoveryTM II system controller
- One 10/100/1000Base-T Ethernet Port
- Supports Universal PCI signaling
- Four channel DMA controller
- Two EIA-232/422 asynchronous serial ports
- Six discrete LVTTL I/O signals
- Two temperature sensors
- Four 32-bit counter/timers
- Two independent JTAG COP emulator interfaces
- VxWorks® real-time operating system
- Linux support form Curtiss-Wright
- SSSL DSP function library
- Range of air and conduction-cooled ruggedization levels available

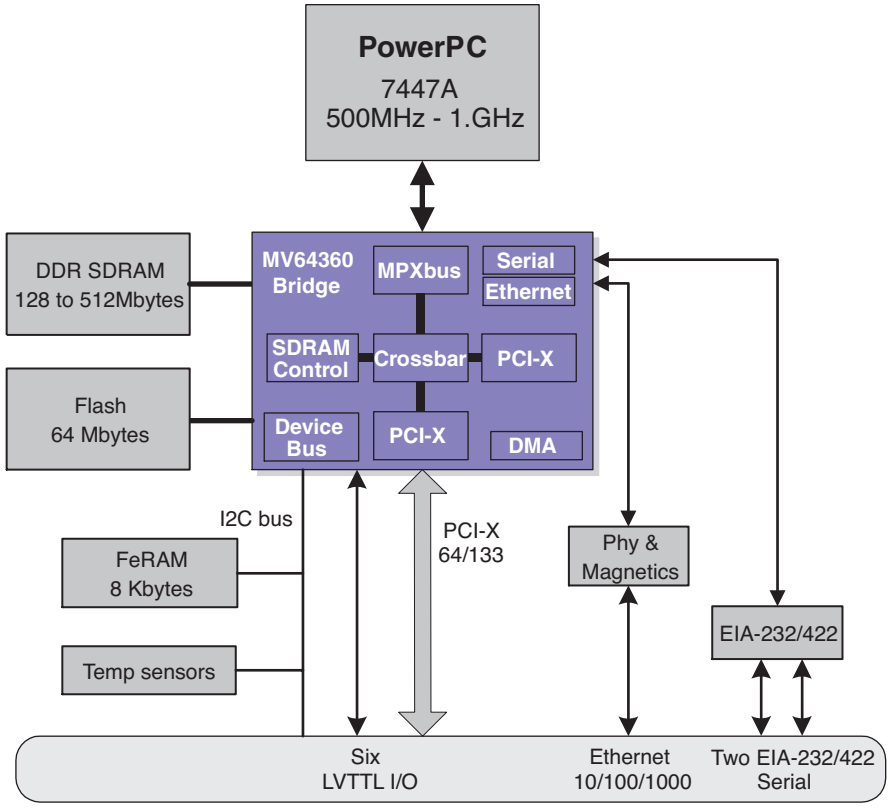
Overview

The PMC-106 card is a high performance PowerPC processor PCI Mezzanine Card (PMC). The high performance PowerPC processor PMC-106 features the FreeScale 7447A processor at speeds up to 1.0 GHz. This processor PMC can be used in a variety of control plane applications or areas where a small form factor solution is required. The high performance PCI-X interface is capable of operating up to 133 MHz and enables this card to process and move data efficiently to and from the host. The PMC-106 is designed to be VITA-32 (PrPMC) compliant. It is capable of operating as a system Monarch or non-Monarch. Figure 1 below shows the PMC-106 block diagram.

The PMC-106 is equipped with up to 512 Mbytes of ECC-protected DDR SDRAM and 64 Mbytes Flash program memory. A single 10/100/1000Base-T ethernet port as well as two EIA-232/422 asynchronous serial ports are available through the Pn4 connector to the rear panel. Two thermal sensors, 8 Kbytes of FeRAM, JTAG emulation ports and six discrete LVTTL signals round out the peripherals. The PMC-106 does not support front panel I/O, but uses the Pn4 connector to route out all rear panel I/O.

The Discovery II bridge provides a four-channel DMA controller which is typically used for managing transfers between processor node memory banks and transfers to and from PCI devices. Various features such as four 32-bit counter/timers, an integrated 2 Mbit SRAM, DDR SDRAM controller, I2C interface, a watchdog timer, an interrupt controller and several multi-purpose I/O pins combine to make the Discovery II a powerful system controller.

Figure 1: PMC-106 Block Diagram



PMC Interface and User I/O Connectors



PCI-X Interface

The PMC-106 is equipped with a PCI-X interface. The PCI-X interface supports 64-bit, 133 MHz PCI-X transfers. The board is backward compatible with either 32-bit or 64-bit host carrier cards from 33 to 133 MHz. When the PMC-106 is operating in Monarch mode, it is responsible for performing PCI bus discovery and managing the four PCI INT# interrupts.

The conduction-cooled version of the PMC-106 adheres to the ANSI/VITA 20 standard for conduction-cooled PMCs. The PMC-106 thermal frame provides the best possible thermal interface for a PMC module by supporting the primary and secondary thermal interfaces as defined by ANSI/VITA-20.

Double Data Rate SDRAM

The PMC-106 supports up to 512 Mbytes of Double Data Rate (DDR) SDRAM. The SDRAM is accessible from the processor and PCI. The PMC-106 also supports Error Checking and Correction (ECC) circuitry. ECC circuitry supports detection and correction of one-bit errors, detection of two-bit errors and detection of three or four-bit errors within the same nibble.

Flash Memory

The PMC-106 provides 64 Mbytes of contiguous, directly accessible, 32-bit Flash memory. The Flash devices are specified for a minimum of 1,000,000 program-erase cycles and a data retention time of 20 years. The memory is readable as byte, half word, or word and written as aligned words. For absolute security against inadvertent Flash programming or corruption, a pin on the Pn4 connector is provided to disable write access to the Flash.

256 Kbytes High Speed SRAM

Incorporated into the Discovery II system controller, the PMC-106 provides 256 Kbytes of high-speed SRAM. While useful as a general purpose high-performance memory area that off loads traffic to SDRAM, the SRAM is particularly beneficial for holding descriptors for Discovery II peripheral devices, allowing DMA units to simultaneously access data from SDRAM while descriptors are accessed from the SRAM.

FeRAM

A FerroElectric (FeRAM) is used to provide non-volatile memory for the PMC-106. The FeRAM is 8 Kbytes and is accessed through the Discovery II I2C bus. FeRAM has the fast read/write speed and low power of battery-backed SRAM and eliminates the need for a battery. EEPROM and Flash require long write times, wear out after being written a small number of times, and use a large amount of power to write data. FeRAM writes instantly, has virtually unlimited endurance and requires very little write power.

Ethernet Interface

The PMC-106 is equipped with a single IEEE 802.3 compliant 10/100/1000Base-T ethernet interface. The ethernet interface is provided on the Pn4 connector for rear panel connectivity only. A debug ethernet LED is provided on the card for visible indication of a valid link.



Serial Ports

The PMC-106 provides two serial ports. The serial ports are implemented with the Discovery II Multi-Protocol Serial Controllers (MPSC). Serial ports 1 and 2 provide EIA-232/422 interfaces, to the rear panel through the Pn4 connector. No handshaking lines, clocks or tri-state control are provided. Driver software for asynchronous communications is provided. The Discovery II provides operation up to 115.2 Kbps for the asynchronous serial ports.

Interrupts

The Discovery II device has a flexible built-in interrupt controller. The device may be configured to allow various interrupt sources to be steered to the appropriate interface, either processor or PCI interrupts. The Discovery II device is capable of enabling any of the Multi-purpose pins as interrupt sources.

The direction of the PCI interrupts is determined by the voltage level of the Monarch pin. When in Monarch mode, the PCI interrupts are inputs from the host card. Otherwise, these pins are outputs to the host card.

Indicator LEDs

The PMC-106 provides two user-controllable green LEDs. There is an additional red LED used to indicate a failure determined by the on-board diagnostic firmware. All LEDs are surface mounted on the top side of the PMC card and viewable from the front of a chassis.

General Purpose I/O

The PMC-106 provides six general purpose LVTTL I/O lines which are accessible at the Pn4 connector. The GPIO signals may be configured individually to be input or output, and separately configured to be open drain or LVTTL. Each signal is pulled up to 3.3 V through a 4.7 KOhm pull-up resistor. The outputs are able to sink or source 24mA. Note that 3.3 V LVTTL is interoperable with 5V TTL logic.

Timers

The PMC-106 board provides a large number of timing resources to facilitate precise timing and control of system events. A list of available timers is given in Table 1 below.

Table 1: Timing Resources

Timer Facility	Implementation	Type	Size	Tick Rate/ Period	Max. Duration
PowerPC time base register	CPU	Free running counter	64 bit	31.25 Mhz/32 ns	18,718 years
PowerPC decrementer register	CPU	Presettable, readable downcounter	32 bit	31.25 Mhz/32 ns	137.4 sec.
General Purpose #0-3	Discovery II	Presettable, readable down counter	32 bit	125.0 Mhz/8 ns	34.3 sec.
Watchdog Timer	Discovery II	Presettable down counter	32 bit	125.0 Mhz/8 ns	34.3 sec.



Temperature Sensors

The PMC-106 provides two temperature sensors to measure board and processor temperatures. Software can read the temperature sensors at any time through the Discovery II I^2C interface. The temperature sensors have user-configurable threshold detection registers and are accurate to +/- 2.5° C.

Built In Test Firmware

The PMC-106 provides a firmware package that performs board initialization and Built In Test (BIT). The BIT routines support Powerup BIT (PBIT) and Initiated BIT (IBIT).

The PBIT consists of a set of essential tests that provide confidence that the hardware is operating correctly while minimizing power-up time. The IBIT capability allows users to initiate testing with a more comprehensive suite of tests to provide more robust testing in an off-line mode. The selection of tests for PBIT and IBIT is configurable. Our BIT firmware is designed to provide 95% fault coverage for testable functionality.

Operating System Software

The PMC-106 is supported by the following operating systems and software libraries:

- A VxWorks Board Support Package is available supporting VxWorks 5.5, Tornado 2.2
- A VxWorks 6.2, Workbench Board Support Package is planned. Please contact your Curtiss-Wright sales representative for availability
- A Linux developers kit supporting kernel 2.4 is available from Curtiss-Wright. See the separate datasheet for details
- The SSSL signal processing library provides Altivec-optimised functions tor common signal processing algorythms. See the separate datasheet for details

Options

The following configuration options are planned:

- 128, 256 and 512MB DDR SDRAM options

Specifications

The PMC-106 is available in a full range of environmental grades starting from commercial air-cooled to extended temperature, rugged conduction-cooled versions. This allows the customer to select the board to match the environmental requirements of the platform.

The tables below show the power, dimensions and weight characteristics of the card.

Table 2: Power Requirements

Power Requirements 7447A @ 500MHz	
5.0V	1.5 Amps typical
3.3V	1.8 Amps typical
Power Requirements 7447A @ 1GHz	
5.0V	2.9 Amps typical
3.3V	1.8 Amps typical

Table 3: Dimensions and Weight

Dimensions and Weight		
Option	Dimension	Weight
Air-cooled	Per IEEE-1386	0.31 lbs or 140 grams
Conduction-cooled	Per Vita-20	TBD

Note: Air-cooled cards available in level 0 and level 100.*
Note: Conduction cooled cards available in level 100 and level 200.*

* Refer to Ruggedization Guidelines data sheet for more information.



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