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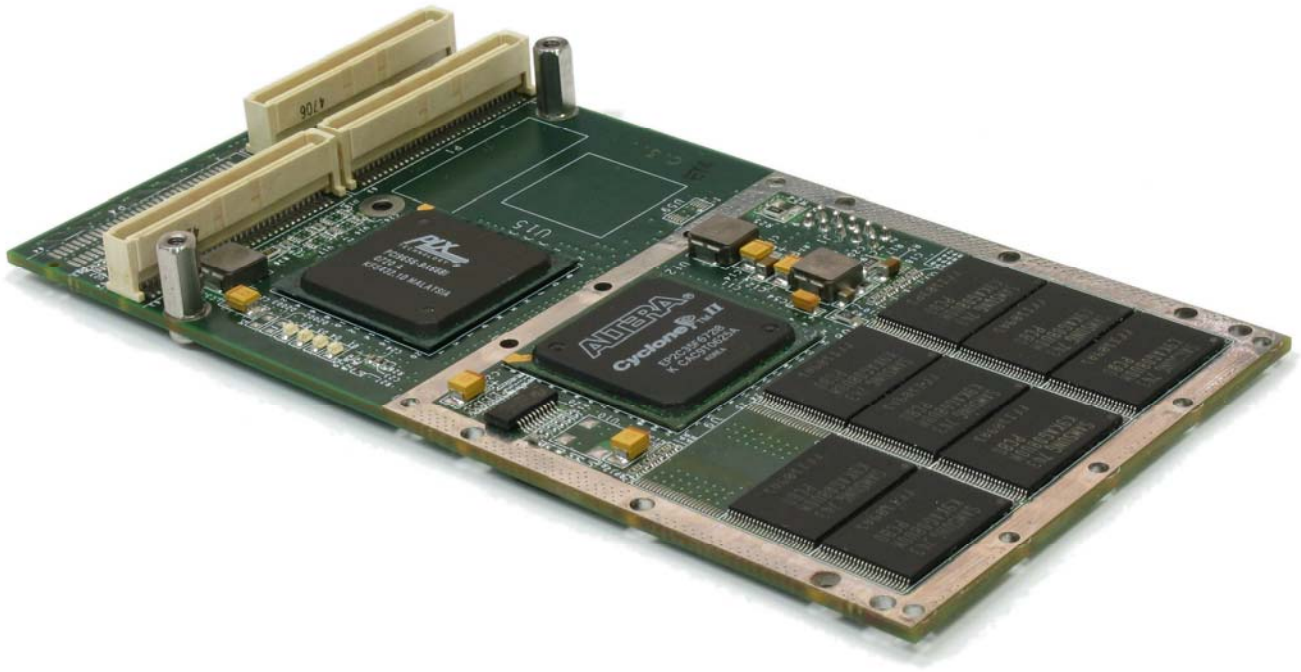
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Find the *Aitech Defense Systems M222* at our website: *Click HERE*

M222

High Density Flash Memory PMC



- **Up to 128 GB NAND Flash Memory in 2 Arrays**
- **Transfer Rate of Up to 130 MB/s**
- **High Performance Flash Controller**
- **Low Power Consumption**
- **PCI Rev. 2.3 Compliant Supporting 64-bit @ 66 MHz**
- **VxWorks and INTEGRITY RTOS Support**
- **Flash Low Level (FLL) Driver for VxWorks**
  - **Basic Read/Write/Erase Functionality**
  - **Detection and Mapping of Bad Blocks**
  - **Write Protection**
  - **Interleaving Support for Flash Banks**
- **Optional Flash Memory Manager (FMM) for VxWorks**
  - **Full File System Read/Write Emulation**
  - **Detection and Mapping of Bad Blocks**
  - **Write Protection**
  - **Wear Leveling**
  - **Automatic Block Management**
  - **Error Correction Code**
  - **Parallel Access to Both Flash Banks**
- **Support for GHS INTEGRITY FFS, with WLFS2**
- **IEEE 1386-2001 (Air Cooled) or VITA 20-2001 (Conduction Cooled)**
- **Commercial/Military Level Ruggedization**
- **Vibration and Shock Resistant**

Aitech Defense Systems, Inc.
A member of the Aitech Rugged Group, Inc.
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Tel: (888) Aitech-8 (248-3248) Fax: (818) 718-9787 e-mail: sales@rugged.com web: www.rugged.com

Overview

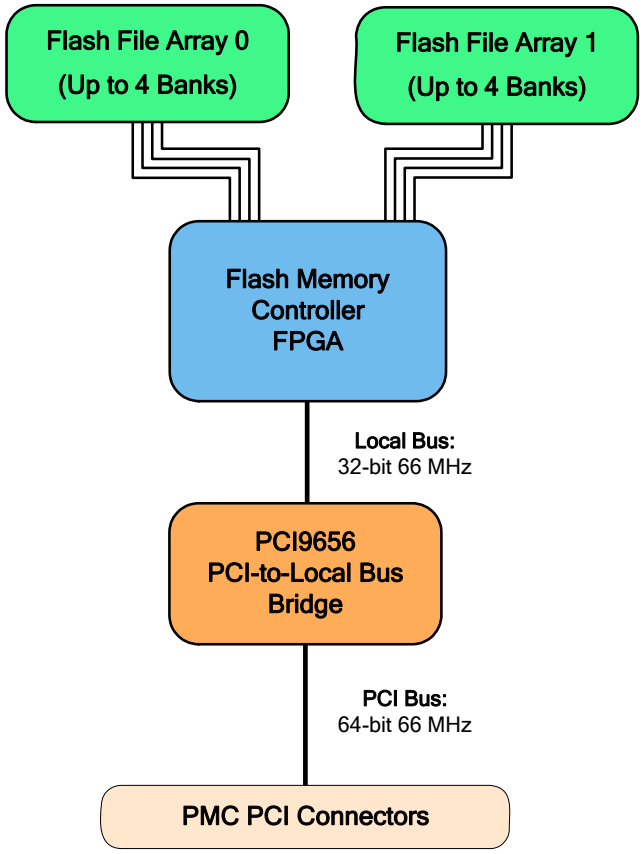
The Aitech M222 is a high capacity Flash memory PMC utilizing advanced high-performance, high-capacity NAND Flash devices to provide up to 128 GB of mass storage in a single industry standard PMC slot.

The board incorporates no moving parts, delivering significantly lower power consumption and higher reliability as compared to hard drive storage solutions.

The PMC PCI interface provides 66 MHz/64-bit data access, and supports master/target functionality over the PCI bus. As PCI master it utilizes its integrated DMA engine for block transfer modes.

Throughput of up to130 MB/s is achieved when DMA transfer mode is used to interface with a fast host interface (at the carrier) via the M222 PLX PCI-to-Local Bus Bridge. (Note that performance is dependant on operation mode, Host Bridge capabilities, and software overhead.)

The M222 software package includes the Aitech Flash Low Level (FLL) driver technology, which provides support for basic Flash read/write/erase operations as well as additional features for basic data protection and bank interleaving for enhanced performance. The optional Aitech Flash Memory Manager (FMM) goes one step further, providing full hard drive emulation, wear leveling, and Error Correction Code (ECC) to ensure data integrity. The FMM employs a unique write-forward mechanism to achieve higher performance than standard file system software packages.



M222 Block Diagram

Features

NAND Flash Memory

The M222 features up to 128 GB of NAND Flash memory that provides a highly cost-effective, high-performance solution for solid-state mass storage with low power consumption.

The Flash is organized in two physical arrays. Each array is composed of 8 Flash devices (each device is 8-bit wide) arranged in parallel to form a 64-bit wide port. The 64-bit wide port is a key element in the high performance provided by the M222.

Each array can host single, dual, or quad bank Flash devices, thus making up to 8 Flash banks available on the M222. Multiple banks are another element essential for achieving high performance through implementation of bank interleaving. (After writing to a given bank, the processor begins writing to a subsequent bank before the current bank has completed its internal programming procedure. This overlapping of access enables the processor to continue writing without having to wait for each bank to finish its program.)

Available standard Flash densities include: 8 GB, 16 GB, 32 GB, 64 GB, and 128 GB. Special configurations are available upon request

PCI Interface

The M222 is capable of master/target operation on the PCI bus. The PCI interface is implemented using PLX PCI9656 PCI-to-local bus bridge. It supports 66 MHz/64-bit data transfers on the PCI side, and a 66 MHz/32-bit local bus.

The M222 PCI Bridge integrates DMA engines utilized for high-performance data transfer between the M222 Flash arrays and the host memory.

Performance

Thanks to its advanced design, the M222 can provide extremely high data transfer rates. Actual performance will depend heavily on the carrier PCI topology and load, host SBC Host Bridge, and host SBC memory performance. Software overhead is also likely to decrease data throughput.

The following ***sustained*** transfer rates have been measured when mounting the M222 PMC on the Aitech C100 SBC (PowerPC 7450 processor, Discovery I System Controller, SDRAM @ 133 MHz), employing the M222 integrated DMA engine, and using FLL software:

	No Interleave	2-Bank Interleave Single Sector	4-Bank Interleave Single Sector	4-Bank Interleave 10 Sectors (2)
Write	59 MB/s	85 MB/s	105 MB/s	130 MB/s
Read	120 MB/s	120 MB/s	120 MB/s	120 MB/s

Notes:

(1) Data transfer is based on 16 kB sectors.

(2) The overhead of the start and end time intervals of the Flash access is fixed, and becomes a smaller overall percentage when the number of sectors is larger. This operation mode is highly effective for the storage and loading of large files and large data chunks.

Software Support

The M222 is delivered with drivers for VxWorks and INTEGRITY RTOS.

The M222 for VxWorks is supplied with Aitech's Flash Low Level (FLL) driver for VxWorks. The FLL supports all basic Flash read/write/erase operations, as well as providing the following features:

- Error detection for mapping bad or worn-out Flash blocks
- Marking of bad blocks
- Write protection
- Fast format option
- Parallel bank writing option for increased performance

Aitech's Flash Memory Manager (FMM) software package for VxWorks is also optionally available for the M222. In addition to the features provided by the FLL driver, the FMM package provides full file system emulation, wear leveling, automatic block management, and an Error Correction Code (ECC) mechanism used to achieve a high degree of data integrity. The ECC mechanism corrects single bit errors and reports multi bit errors. For more information on FMM, refer to the FFM data sheet or contact an Aitech representative.

The M222 for INTEGRITY is supplied with the WLFS2 low-level driver that connects the M222 hardware to standard INTEGRITY file systems.

INTEGRITY's higher level FFS file system can also be mounted on the WLFS2 system. WLFS2 and FFS are not provided by Aitech and are available from Green Hills Software.

Mechanical Features

The M222 PMC is available in two mechanical formats:

- Air-cooled per IEEE 1386-2001 for installation on commercial and rugged air-cooled carrier boards.
- Conduction cooled per ANSI/VITA20-2001 for installation on IEEE 1101.2 conduction-cooled carrier boards.

High power components are cooled by an aluminum heatsink.

Dimensions

Air-cooled:	per IEEE 1386-2001
Conduction cooled:	per ANSI/VITA 20-2001

Thermal Management

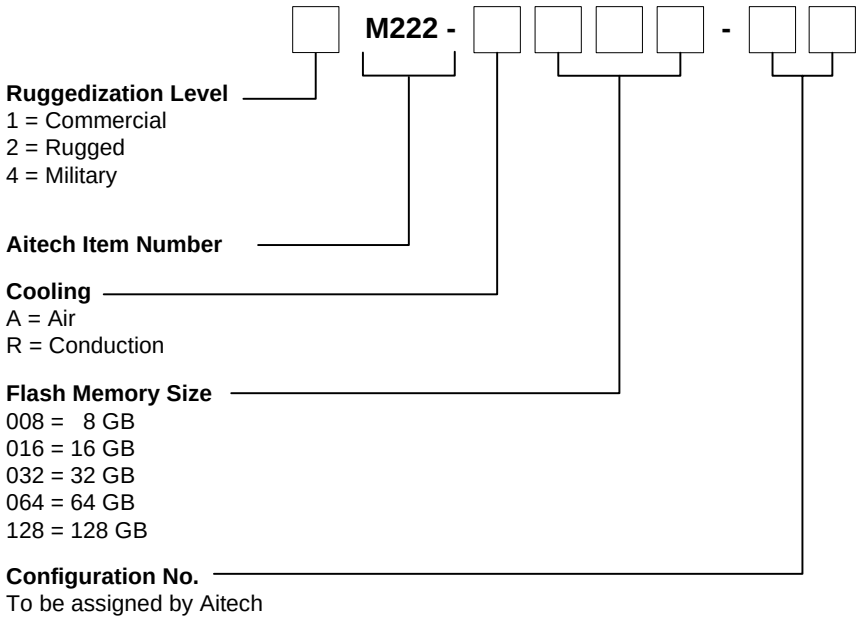
A careful mechanical design including custom Heatsink modules combined with a metal frame allow optimal heat dissipation and relief of the board.

Power Requirements

The M222 draws all its power from the +3.3V power supply. On-board power circuits provide other power levels required by its components.

Total power consumption: 1.5 W (typ)

Ordering Information for the M222



Example: 2M222-R064-00

For additional configurations, please contact your Aitech sales representative.

For more information about the M222 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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