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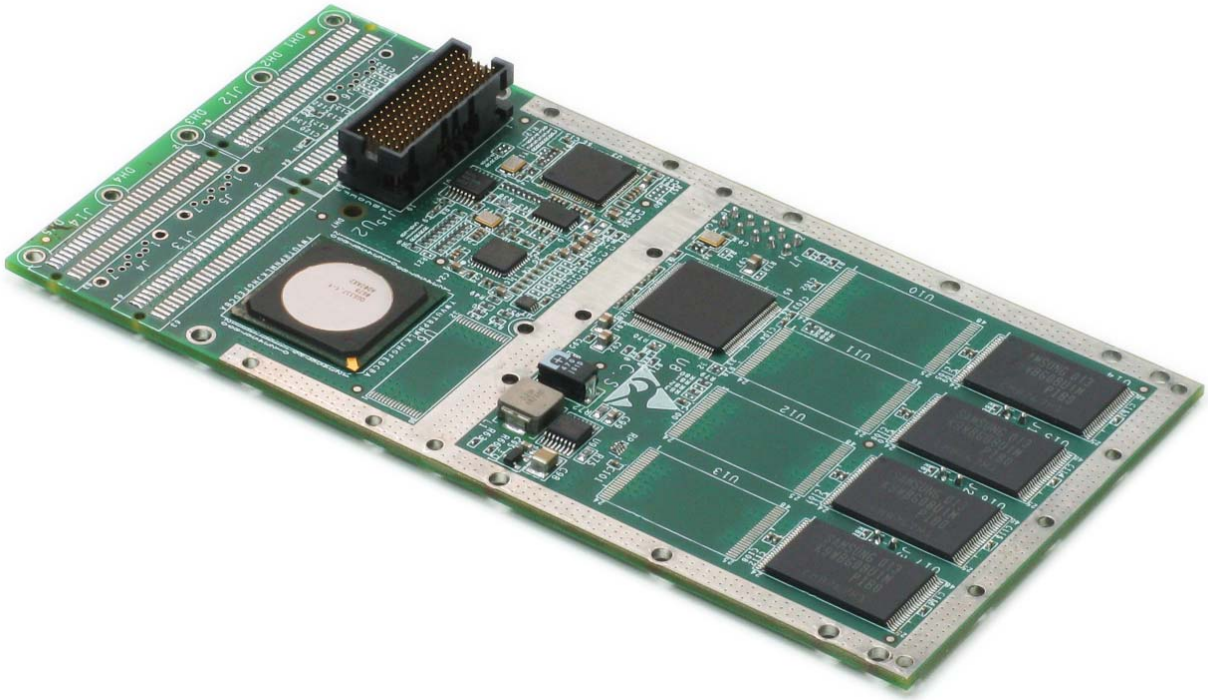
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Find the *Aitech Defense Systems M224* at our website: *Click HERE*

M224

Mass Storage PMC/XMC



- **Single width Rugged PMC/XMC**
- **Complete SATA based solution including PCI/PCIe to SATA controller and NAND Flash SSD**
- **Up to 512 GB (MLC) and 256 GB (SLC) NAND Flash Capacity**
- **PCIe Gen 1 Interface x1 Lane (XMC)**
- **PCI/PCI-X 64-bit @ 33/66/100/133 MHz interface (PMC)**
- **Built-in RAID Processor supporting RAID 0, 1 and JBOD modes**
- **High Performance**
  - **Up to 210 MB/s sustained write (SLC)**
  - **Up to 140 MB/s sustained read**
- **Built-in ECC, Wear Leveling, and Bad Block Management**
- **External Write Protect Support**
- **Low Power Consumption**
- **Drivers for:**
  - **VxWorks®**
  - **Windows™**
  - **Linux®**
- **IEEE 1386-2001 (Air Cooled PMC) or VITA 20-2001 (Conduction Cooled PMC) or ANSI/VITA 42.0-2008 (XMC)**
- **Commercial/Military Level Ruggedization**
- **Vibration and Shock Resistant**

Aitech Defense Systems, Inc.
A member of the Aitech Rugged Group
19756 Prairie Street, Chatsworth, CA 91311
Tel: (888) Aitech-8 (248-3248) Fax: (818) 407-1502 e-mail: sales@rugged.com web: www.rugged.com

The Aitech M224 is a complete SATA mass storage PMC/XMC solution suitable for harsh environments. The board incorporates no moving parts, providing higher reliability and consuming significantly lower power than rotating media hard drive storage solutions.

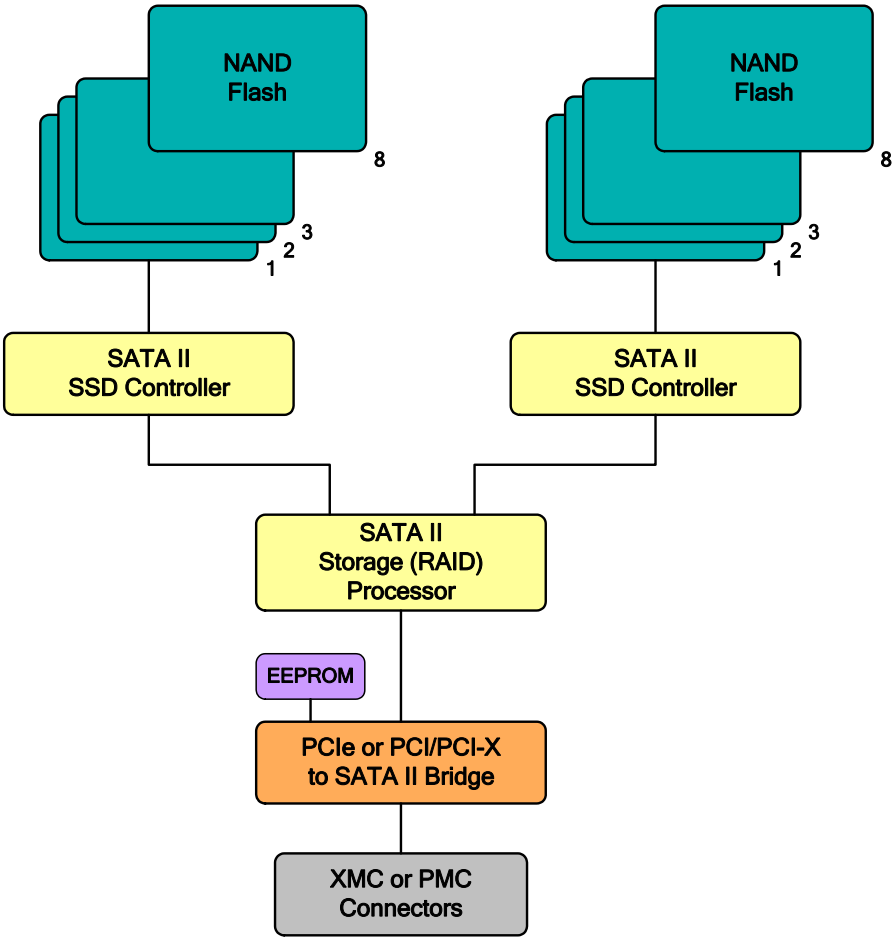
M224 memory comprises two banks of NAND Flash devices providing a maximum total capacity of 512 GB. Each Flash bank is managed by its own SSD controller, enabling operation as an independent SATA II Flash disk. The SSD controllers' built-in bad block management, wear leveling, and error correction ensure reliable high speed operation and minimize the burden on the host processor.

An on-board RAID processor provides standard RAID functionality so that the two Flash disks can be configured for maximum performance (RAID 0 – striping), maximum data integrity (RAID 1 – mirroring), or maximum capacity (JBOD – concatenation).

Performance of the M224 is exceptional, with sustained sequential read and write data rates of up to 210 MB/s and 140 MB/s respectively, when configured with SLC Flash memory and when operating in RAID 0 mode.

PCIe and PCI-X controllers, together with standard PMC/XMC connectors, enable the M224 to be used with a vast number of host boards, for convenient incorporation in nearly any rugged system.

The M224 has no socketed components. All components are soldered on the board, making the M224 suitable for use in high vibration and shock environments over the full military temperature range.



M224 Block Diagram

Architecture

The M224 is a complete solid state mass storage solution based on SATA high performance technology.

It comprises three main building blocks:

- PCI/PCIe to SATA II controllers
- Storage (RAID) processor
- SATA SSD controller (NAND Flash)

PCI/PCIe to SATA Controllers

The M224 incorporates a PCIe (XMC) or PCI/PCI-X (PMC) to SATA II controller.

The controller performs as master/target on the bus and implements efficient mechanisms for enhancing data throughput and performance. These mechanisms include DMA engines and deep buffers allowing for wide bandwidth and high bus utilization with minimum host processor intervention.

Storage (RAID) Processor

The storage processor provides the M224 with enhanced capabilities compared to standard SSD solutions. The RAID capabilities provided by this processor allow for RAID 0, 1, and JBOD configuration of the M224 on-board SSDs. Each of the operation modes has its advantages and it is up to the system designer to configure as required by the application. RAID 0 (striping) provides the highest performance; RAID 1 (mirroring) provides redundancy over the two M224 SSDs, and JBOD allows standard operation as a single disk media.

RAID configuration is set in hardware, eliminating the need for specially tailored drivers. In case such drivers are available (for selected OS) they will overwrite the hardware setting.

SATA SSD Controller

The M224 provides two physical disk devices each controlled through a dedicated SATA SSD controller. Each controller is currently capable of managing up to 256 GB of NAND Flash. The SSD controller employs a quad channel architecture allowing for best performance and highest throughput connecting to the NAND Flash. This implementation allows for interleaving and parallel operation between the NAND Flash channels to eliminate the relatively low access times inherent in the Flash devices.

In order to ensure maximum reliability and longevity of the Flash media, the SSD controllers include built-in Error Correction Code (ECC), wear leveling, and bad block management functionality. They also provide support for external write protection via a dedicated pin that is routed to the M224 connectors.

NAND Flash Memory Devices

The M224 is available with either SLC or MLC NAND Flash memory devices. MLC devices have double the capacity of SLC.

For highest performance and data reliability, Aitech recommends SLC devices.

For applications requiring access to large amounts of data, and with relatively few write operations, MLC devices provide a very high capacity solution.

Contact an Aitech sales representative for assistance determining which Flash memory option is most appropriate for your application.

Software Support

The M224 is delivered with VxWorks, Windows, and Linux low level drivers that connect to and take full advantage of the Operating System native SATA stacks. No additional software is required for normal operation.

This approach reduces integration efforts and risks providing an out-of-the-box solution.

Environmental

All Aitech products are available in three levels of ruggedization and two mechanical formats. The ruggedization levels differ mainly in operating temperature, and resistance to shock, vibration, and humidity.

Refer to the *Aitech Ruggedization Levels* datasheet for more information on selecting the ruggedization level that meets your specific needs.

Mechanical Features

The M224 is available in two mechanical formats:

XMC

- Air-cooled per ANSI/VITA 42.0-2008 for installation on commercial and rugged air-cooled carrier boards.
- Conduction cooled ANSI/VITA 42.0-2008 for installation on IEEE 1101.2 conduction-cooled carrier boards.

PMC

- 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.

Thermal Management

The M224 is a low power mezzanine requiring no special thermal design.

M224
Mass Storage PMC/XMC

Power Requirements

The M224 draws all its power from the +3.3 V power supply. On-board power circuits provide other power levels required by its components.

Specifications

SATA Flash Disk

Memory Type	SLC or MLC NAND Flash
Memory Capacity	Up to 256 GB with SLC Up to 512 GB with MLC

SATA Controllers

PCI	SATA II: 3 Gb/s
PCIe	SATA II: 3 Gb/s

Bus Interfaces

Interface	Rev	Performance
PCI (PMC)	2.3	64-bit @ 66 MHz
PCI-X (PMC)	1.0a	64-bit @ 133 MHz
PCIe (XMC)	1.0a	x1 (Single Lane)

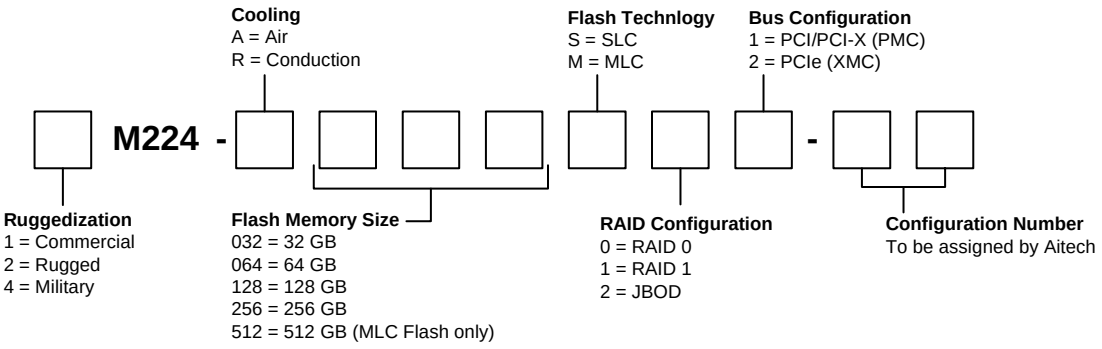
Performance (sustained) *

Flash Type		PMC		XMC
		PCI-X	PCI 64-bit @ 66 MHz	PCIe Gen 1 1 Lane
SLC	Read	210 MB/s	170 MB/s	150 MB/s
	Write	140 MB/s	90 MB/s	80 MB/s
MLC	Read	205 MB/s	165 MB/s	115 MB/s
	Write	70 MB/s	65 MB/s	75 MB/s

* Core i7-620LE @ 2.0 GHz host; Windows 7 Platform; RAID 0 Configuration; CrystalDiskMark ver 3.03 Sequential Test, block size = 1024 kB

Power Consumption

4.5 W (typical) 6 W (maximum)



Example: 2M224-R128S02-00

For more information about the M224 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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