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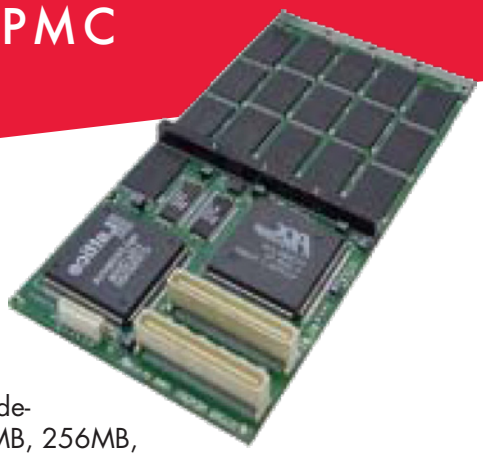




Data Sheet

MM-6190FT

2GB Non-Volatile Solid State FLASH PMC



Features

- Capacity: 128MB, 265MB, 512MB, 1GB or 2GB
- Solid State No Rotating or Mechanical Parts
- Totally Non-Volatile Data Retention
- Operating Temperature
- DMA Initiator and Target
- Error Detection and Correction
- VxWorks® TrueFFS™ driver
- Air- and conduction-cooled versions

Overview

The MM-6190 is a 32-bit/33MHz PMC module that utilizes NAND FLASH devices to provide up to 2GB of non-volatile, solid state memory. This memory technology combined with the TrueFFS driver for the VxWorks Operating System makes the MM-6190 the optimum non-volatile, solid state storage solution and booting device.

Data Retention

FLASH memory is inherently non-volatile and does not require power to retain data. This provides for data integrity under unstable power conditions or planned shut downs.

Memory Controller with DMA

The MM-6190's PCI rev. 2.1 compliant interface operates in 32-bit 33MHz and includes a DMA initiator for maximizing read and write transfer rates. The MM-6190FT's hardware centric approach places an ASIC at the bus interface supplemented by a Complex Programmable Logic Devise (CPLD) which minimizes latency, overhead and software integration.

Memory Array

The array utilizes dense NAND FLASH devices to provide 128MB, 256MB, 512MB, 1GB or 2GB of non-volatile, solid state memory. To provide these larger configurations and stay within the limited physical specifications of a conduction cooled PMC, specialized stacking technology is utilized that maximizes memory density.

Conduction Cooled

Intended for use on Single Board Computers with conduction-cooled thermal frames that include PMC cooling surfaces and mid-plane shunts as defined by VITA's 20-200X specification, the MM-6190FT has been designed for environments with extreme shock/vibration, humidity, and operating temperatures that range from -40°C to +71°C. The card utilizes the lowest power, extended temperature devices to minimize power consumption and heat dissipation. Thermal pads designed around the maximum surface area of each device connect to a primary PCB thermal layer that transfers heat from the mezzanine card to the carrier's thermal frame.

In addition to the thermal layers and extended temperature devices, the conformally coated MM-6190FT includes an anodized heat sink, board stiffener and conforms to the ANSI/VITA 20-2001 specifications for conduction-cooled PMCs (CCPMC).

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FLASH Memory

The MM-6190FT uses NAND FLASH to optimize file structure where each word does not need to be read, but instead provides that sectors of data and can be moved to and from the media supporting a hard-drive-like repository structure for data storage to support file systems and allocation tables (FAT).

Dynamic Wear Leveling

FLASH memory has a limited number of write/erase cycles (the MM-6190FT utilizes memory devices with 250,000 write/erase cycles). The use of wear-leveling algorithms guarantees the use of all FLASH components in the array at the same level of write/erase cycles to avoid repeatedly writing and erasing the same location. By virtual mapping of logical sectors to physical blocks, the entire memory array is utilized/degraded evenly.

Disk Emulation

TrueFFS implements a FLASH-Translation-Layer (FTL) that enables FLASH devices to emulate traditional hard disk drives. This driver-level interface provides the embedded application the ability to call the relevant file system interface as if it were accessing a standard hard disk drive.

Bad-Block Mapping

Inherent to NAND FLASH technology is the occurrence of bad blocks. TrueFSS has algorithms that, transparent to the user, replace bad blocks with new blocks from available spares.

Booting from the MM-6190FT

Certain mechanisms within TrueFSS complicate use of the same FLASH memory as a boot device but TrueFSS provides the ability to format the device at an offset, leaving a portion of memory dedicated for storing boot images.

Error Detection & Corrections

The block device driver detects and reports all non-correctable errors while correcting one single-bit error per half block.

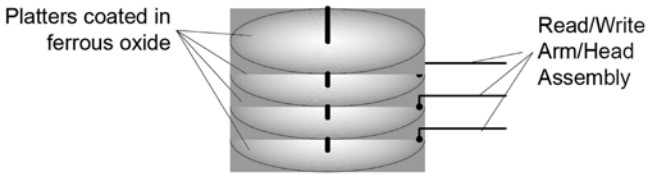
System Application

Designed for storing application code, video imagery, mission data, tactical maps and database records in extreme environmental applications, the MM-6190FT provides up to 2GB of solid state volatile memory for carriers with PMC sites.

PMC's have become the standard form factor of choice for I/O on today's high performance board-level VME and CompactPCI systems. Electrically equivalent to the traditional PCI bus, most VME and cPCI single board computers now include 1 or 2 PMC sites for flexible I/O integration.

Solid State vs. Traditional Hard Disk

Rotating hard drives have mechanical, moving parts which includes a disk head. When executing a read or write, the disk head will usually first be required to perform a head seek, much like a needle on a phonograph must first seek before finding an individual track on a record. This creates latency not experienced when using solid state memory such as found on the MM-6190FT.



Greater importance in high vibration/shock environments is the delicacy and complexity of these mechanical moving parts. The hard drive media (the disks themselves) also have a narrower temperature, humidity, and condensation range than found with solid state IC devices.

Certain industrial enclosures include vibration isolators and specialized cartridges in an attempt to compensate for these hard drive deficiencies. But no matter what the enclosure, rotating disks are often precluded from utilization as mass storage devices for data recorders, moving maps, SONAR, RADAR, fire control systems, black boxes, data acquisition systems and rugged servers because the precision components cannot withstand the environmental conditions required by these applications. Unlike rotating mechanical hard disk drives, the MM-6190FT is a totally integrated, solid state device with no moving parts and is specifically designed for these types of severe conditions.

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FLASH PMCs

Solid State vs. PMC adapters with PCMCIA cards

The MM-6190FT's FLASH memory chips are mounted directly onto the card. Other solutions combine PCMCIA FLASH cards with PMC-to-PCMCIA adapters (such as MM-6180P), but this approach has several drawbacks.

The PCMCIA interconnects utilize a relatively fragile 8 or 16 pin connection intended for commercial lab use that must be factored into consideration when deploying a system for use in high vibration/shock environments. This PCMCIA interconnect also adheres to the ATA protocol which has significant overhead that impeded transfer rates from the PCI bus to the memory devices.

Alternatively, the MM-6190FT does not include a PCMCIA bridge so transfers are limited by the access times of the FLASH memory devices. Because PCMCIA connector pins are not utilized the card can withstand higher vibration/shock levels along with increased MTBF's than can be realized with the adapter approach.

Table 1: Specifications

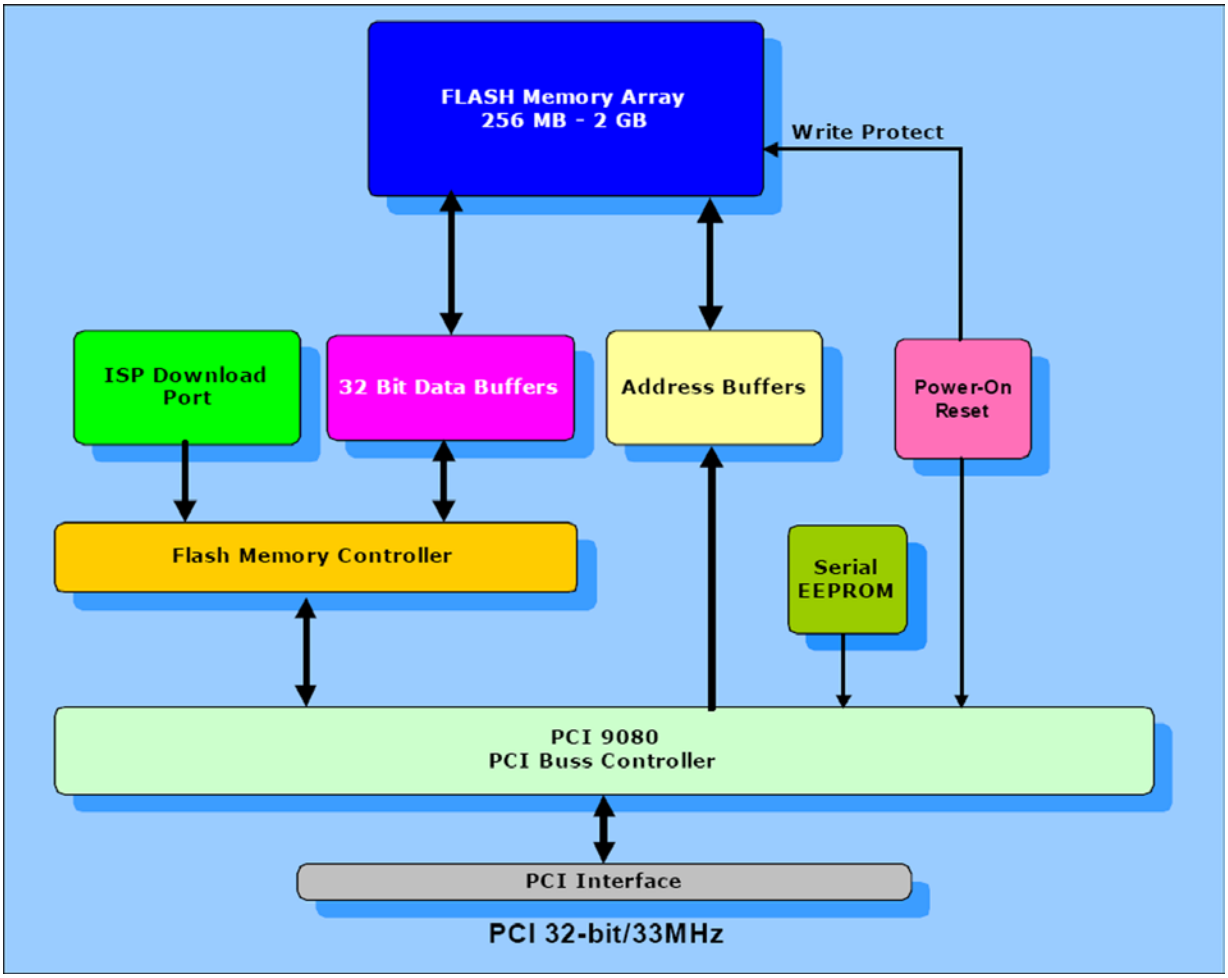
Capacity		256MB, 512MB, 1GB, 2GB	
Interface		32-bit @ 33MHz	
Compatibility		CCPMC (ANSI/VIA 20-2001) Common Mezzanine Card Family: CMC, IEEE PI386, Draft 2.2 Physical & Environmental Layers for PCI Mezzanine Cards: PMC, IEEE PI386.1, Draft 2.3	
Bus Mastering		DMA Initiator & Targeting capabilities	
Interrupts		Supports Interrupts	
Input/Output Interface		3.3V or 5V Signaling PCI rev 2.2 compliant	
Temperature	Operating	-40°C to +71°C card edge temp	
	Storage	-55°C to +85°C	
Humidity	Operating	0 to 100% non-condensing	
	Storage	0 to 100% non-condensing	
Vibration	Sine (I)	10g peak (3) 15-2kHz*	
	Random (4)	.04g2/Hz 15-2k/Hz*	
	Shock (5)	30g peak half sine 11ms*	
ESD		1,500V, human body model	
Power Requirements	Standby Operate	-5V +3.3V 60mA 4mA 150mA 575mA (max)	
Physical Dimensions		Height: TBD Depth: TBD Front Panel Height: TBD	Width: TBD Maximum Component Height: TBD Weight: TBD

Notes:
* The MM-6190FT and all PCI Mezzanine Cards (PMCs) are mezzanines that are subject to the characteristics and attributes of the carriers on which they reside. Vibration statistics presented here are only estimates based upon the card residing on a conduction-cooled Single Board Computer.

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Figure 1: MM-6190FT Block Diagram



Warranty

This product has a one year warranty.

Contact Information

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