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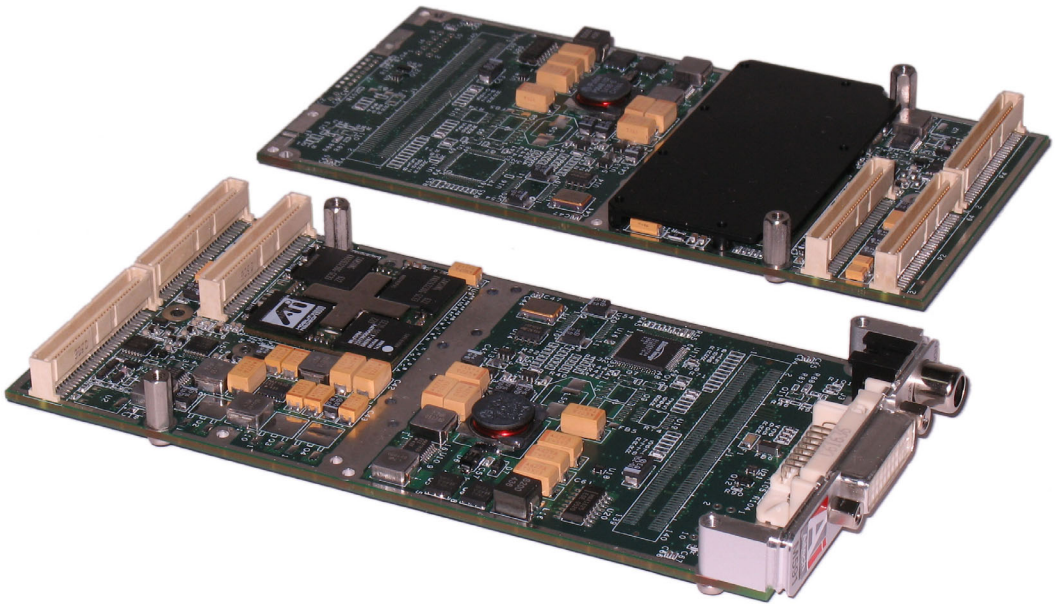
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# M591
## Dual Head Graphics PMC



- ATI M9 Graphics Processor
- High Performance 2D and 3D Processing Capabilities
- Dual Independent Heads
- On-Chip 64 MB DDR Frame Buffer
- Dual DVI Outputs Capable of up to 1600x1200 @ 75Hz with 32bpp
- CRT (RGBHV) Output Capable of up to 2048x1536 @ 85Hz with 32bpp
- TV Output Supporting NTSC/PAL/RS170A/CCIR Formats
- Video Output Routed to Front Panel and P4 I/O Connector
- Front panel connector for CRT, DVI and TV outputs
- PCI Rev. 2.2 Compliant (with Universal I/O Signaling Level)
- BIOS Flash & Code (for Pentium Based Platform)
- Software Packages including OpenGL 2D/3D support available for:
  - VxWorks
  - INTEGRITY
  - Windows
  - Linux: Fedora, Ubuntu
- Full Dual Head Software Support
- WindML and WindML Configuration Tools
- 3 Ruggedization Levels
- Air Cooled and Conduction Cooled
- Vibration and Shock Resistant

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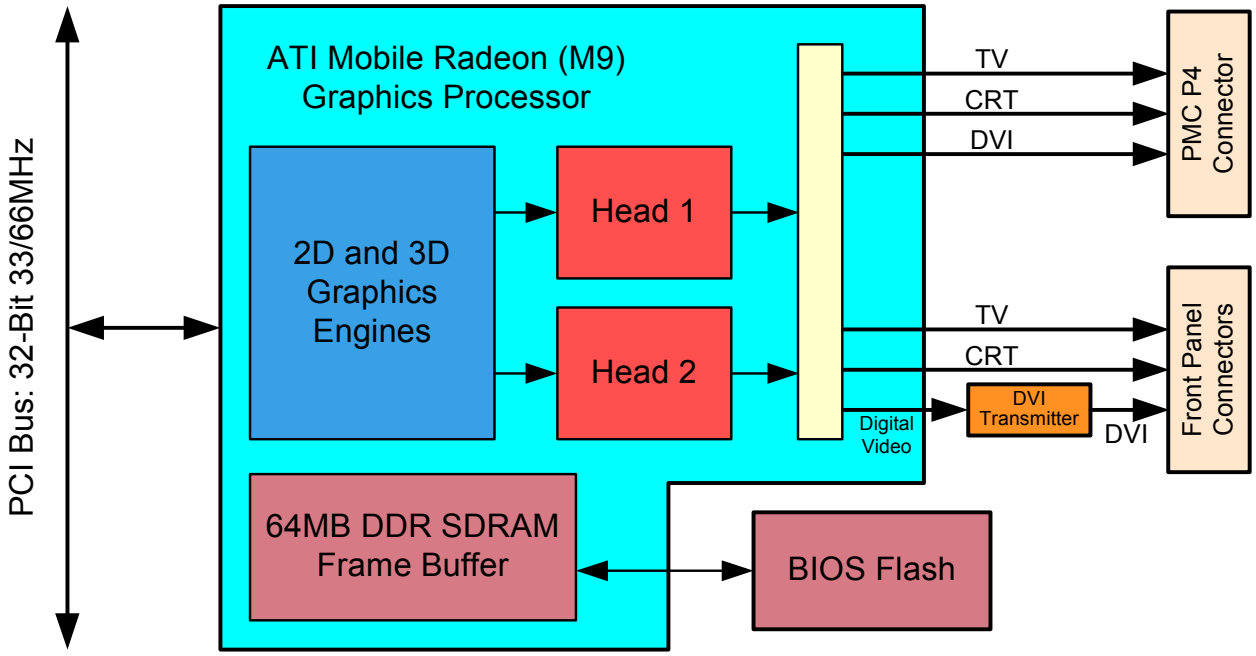
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## Dual Head - Powerful 2D/3D Processing

Based on the advanced ATI Mobility Radeon 9000 (M9) graphics processor, Aitech's M591 Dual Head Graphics PMC can simultaneously drive two separate displays with two independent graphic streams. The M591 is designed to deliver high performance graphics in harsh environment applications, providing high-resolution graphics, with support for various monitors.

The M9-CSP64 hybrid graphics processor, with its integral 64 MB video memory array provides high performance graphic processing capabilities for high-resolution 2D and 3D applications. Each of the two M591 graphics heads can drive a DVI, CRT, or TV (Composite/S-Video - PAL/NTSC) display. The two displays may operate independently of one another, or in clone mode, displaying the same video.

The M591 software package supports all on board capabilities including OpenGL, standard VGA, and X11.




**M591 Block Diagram**

## Functional Features

### Graphics Processor

The M591 PMC graphics engine features the ATI Mobility Radeon 9000 (M9) high performance graphics processor. This device performs high quality 3D polygon and texture acceleration and incorporates an integrated VGA core and dual RAMDAC units. Supporting an extensive function set for 2D and 3D graphics, the M591 unifies 2D, 3D, and video operations in multiple execution pipelines, allowing high flexibility data handling, and preventing overloading specific data paths.

The 64 MB of on-chip DDR SDRAM operating at 200 MHz clock and 128-bit width is used by the M9 for processing operations, frame buffer, texture buffer, and overlay buffer.

The M591 PMC provides dual progressive RGBHV outputs with HSYNC and VSYNC through the two RAMDAC units integrated in the M9 (triple 10-bit palette DAC at 400 MHz).

Supported resolutions and refresh rates include:

| Resolution | Bits per Pixel | Refresh Rates (Hz) |
|---|---|---|
| 2048 by 1536 | 16, 32 | 60 – 85 |
| 1920 by 1440 | 16, 32 | 60 – 90 |
| 1920 by 1200 | 16, 32 | 60 – 100 |
| 1920 by 1200 | 16, 32 | 60 – 120 |
| 1600 by 1200 | 16, 32 | 60 – 120 |
| 1280 by 1024 | 16, 32 | 60 – 160 |
| 1152 by 870 | 16, 32 | 60 – 200 |
| 1080 by 808 | 16,32 | 60 |
| 1024 by 768 | 16,32 | 60 – 200 |
| 832 by 624 | 16,32 | 60 – 200 |
| 800 by 600 | 16,32 | 60 – 200 |
| 640 by 480 | 16,32 | 60 – 200 |
| 640 by 480 | 16,32 | 60 interlaced |
| 632 by 480 | 16,32 | 60 |
| 512 by 512 | 16, 32 | 30, 60 |

RGB signals are available both at the PMC front panel and P4 I/O connector.

### DVI PanelLink

The M591 is capable of driving two flat panel displays ranging from VGA to UXGA resolutions (25 - 162 Mpps) in a single link DVI compliant interface. The physical interface is a TDMS type interface controlled by one on-chip controller for the rear connection (P4 PMC I/O connector), and a second external PanelLink tranmitter for the front panel DVI connection (on air-cooled versions).

### Video Output

An integrated TV encoder shares the secondary DAC, to provide a video output interface to support interlaced type monitors.

The video output supports NTSC or PAL video formats, both in composite and S-Video (Y/C) signal formats.

Optionally, the M591 video outputs support interlaced RGsB format.

The video output is routed to the M591 P4 I/O connector and to the front panel (air-cooled versions).

### PCI Bus Interface

The M9 is the only device on the M591 PMC that interconnects to the PCI bus. It supports 32-bit PCI bus operation at 66 MHz and is fully compliant with the PCI Rev. 2.2 specification.

The M591 PMC supports +3.3V PCI signaling level. It does not utilize the PCI V_I/O power supply.

To achieve maximum data transfer rate and high PCI bus utilization, the M9 integrates multiple high performance DMA engines to transfer graphic data between the host system memory and its local frame buffers.

## Software Drivers

**Vxworks and INTEGRITY Based Platforms**
The M591 is supported by the ALT Software Embedded OpenGL Genesis package, with the following features:

- INTEGRITY® (GHS) and VxWorks® (WindRiver Systems) RTOS Support
- X-Windows Support
- Dual Display Support
- Support for OpenGL 1.3, OpenGL ES
- Support for GLUT 3.7, GLU 1.3, GLX 1.2
- High Performance WindML Display Drivers

For systems requiring DO-178B certification, the ALT Software DO-178B OpenGL Orion package is available.

The M591 is also supported by the WindRiver WindML 5.1 package and its configuration tools utility.

**Windows Based Platform**
The M591 is supported by the 3D ATI graphics driver, with the following features:

- Windows XP and Windows 2000
- ATI driver and Catalyst control panel
- Full hardware acceleration support
- Support TV out (Composite)
- Support standard OpenGL 1.3
- Support Direct X 9.0
- Support full dual heads control: extended and clone modes

**LINUX Based Platform**
The M591 is supported by the LINUX ATI Radeon graphics driver, with the following features:

- 3D Graphics Driver under the LINUX: Fedora/Ubuntu
- Support standard OpenGL 1.3
- Support Resolutions: up to 1280x1024.
- DRI (Direct Rendering Infrastructure) support
- Full Dual heads support through a LINUX display control panel

## Mechanical Features

The M591 PMC is available in two mechanical formats:

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

## Power Requirements

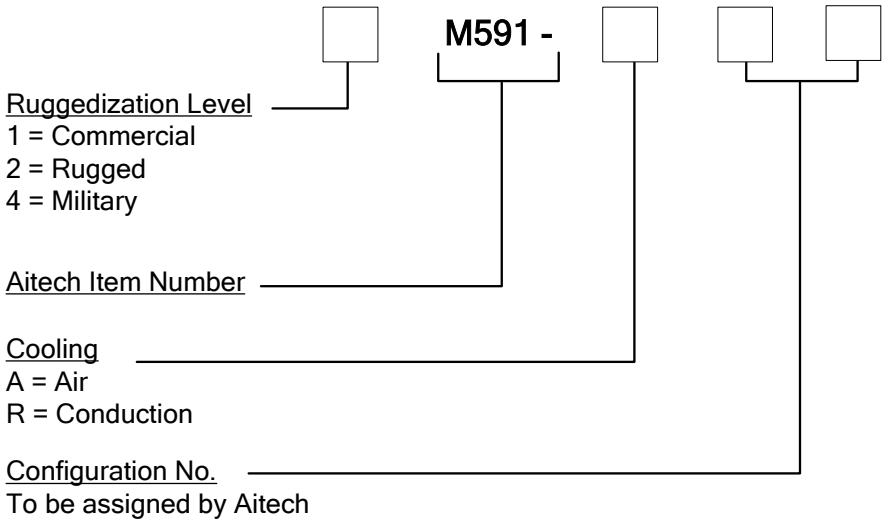
The M591 draws its power from the host +5V and +3.3V power supply. It has its on-board power circuits for other power levels required by its components.

Total power consumption (Typ): < 8 W

## Environmental Features

Please, refer to the Aitech ruggedization datasheet.

## Ordering Information for the M591




Example: 2M591-R00

For more information about the M591 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).



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