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GENERAL MICRO SYSTEMS
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GMS PMC VGA

Revision C February 11, 2000

“Da Vinci”

Procedure # 000-027-01.1

GMS
COMPUTING ENGINES

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Thank You!

If you have just received our General Micro Systems, the **PMC VGA Video Graphic Board “Da Vinci”**, thank you for your purchase! We at General Micro Systems have engineered and produced a high quality product that combines reliability with performance. Your organization will see the benefits of your General Micro Systems, Inc. purchase for years to come as we provide a total solution through quality products and continuing customer support.

If you have requested a manual and are reading it prior to purchase, we appreciate your interest and look forward to having you join the growing number of GMS customers. On the last page of this document is a list of additional products offered by GMS. This list includes the following Modules and Support:

- VME CPU Modules,
- Compact PCI CPU Modules,
- PMC Modules,
- Peripherals,
- Software Support,
- Additional Modules.

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**GENERAL MICRO SYSTEMS, INC.
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| AutoDesk® | AutoCAD® |
| IBM® Corporation | OS/2® |
| QNX® Software Sys, LTD | QNX™ |
| Cirrus Logic® | CL-GD5446 Technical Reference Manual |

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ABOUT THIS MANUAL

OVERVIEW

The purpose of this manual is to guide the user in the set up and use of the General Micro Systems, Inc. **PMC VGA Video Graphic Board “Da Vinci”**. The manual is sectioned as follows:

About this Manual:

Contains explanations of conventions used, and contact information in the event the user requires additional information.

Introduction:

Presents the PMC VGA Video Graphic board and discusses its features.

Hardware Preparation:

Provides preparation, installation and hardware configuration instructions.

Software Setup & Configuration:

Describes the PMC VGA Video Graphic board system configuration.

Appendix A:

Provides connector pin assignments.

RELATED DOCUMENTS

- Intel® Corporation, 82559 (10Base-T/100 Base-TX LAN).
- Intel® Corporation, 21150 (PCI-to-PCI Bridge).
- Microsoft® Corporation, (Windows NT™).
- AutoDesk® AutoCAD®
- IBM® Corporation OS/2®
- QNX® Software Sys, LTD QNX™
- Cirrus Logic® CL-GD5446

SUPPORT

Additional copies of this document, or further information can be obtained by contacting General Micro Systems through the following channels:

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Web Site:

GMS - www.gms4vme.com
Cirrus Logic – www.cirrus.com/prodtech (for additional
Driver support).

E-Mail:

GMS - sales@gms4vme.com

INTRODUCTION

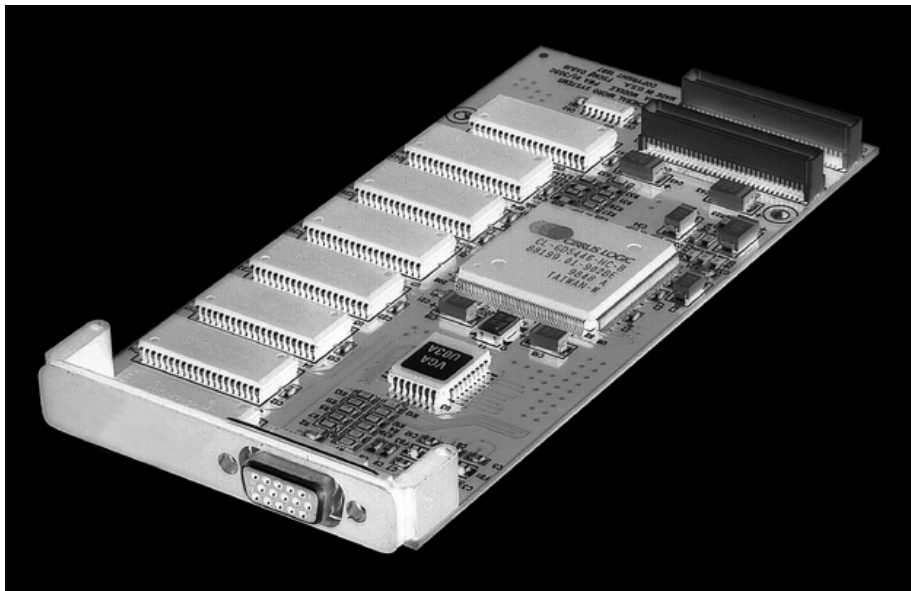
VGA Graphics Module

GENERAL

The PCI specification defines a 4.2-inch by 12.3-inch board that plugs in perpendicular to the motherboard. Full size PCI boards are impractical for VME applications due to their length relative to the depth of a standard VME card frame. Even if a reduced size PCI card is used, the 4.2-inch height of the PCI card interferes with six adjacent VME slots. Recognizing the need for smaller form-factor PCI cards, the IEEE proposed a draft standard (P1386) defining a Common Mezzanine Carrier concept leading to the development of PMC (PCI Mezzanine Carrier) boards. PMC cards use the logical and electrical layers of the PCI cards but are smaller and coplanar to the host assembly board. PMC boards are functionally equivalent to standard PCI without the mechanical problems in a VME environment.

The **PMC VGA Video Graphic board “Da Vinci”** in Figure 1 provides:

- Ultra High Resolution Video.
- Support for 1280 x 864 at 16 million colors.
- 64-bitBLT graphic engine with 2/4-MB of RAM.
- Support for Windows NT™, QNX®, and Real I/X operating systems.



Note: PMC VGA supports +5 Volt Interface

Figure 1. GMS PMC VGA Video Graphic Board

PMC VGA “Da Vinci” System Block Architecture

A simplified perspective of the PMC VGA “Da Vinci” system architecture is illustrated in Figure 2. The following subsections provide an overview of the major components comprising the PMC VGA architecture.

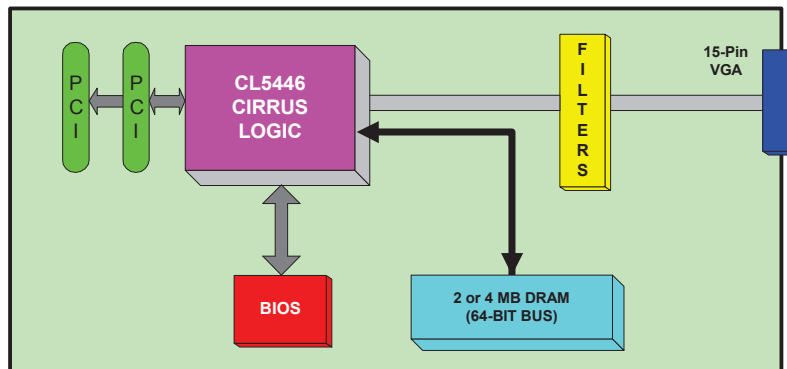


Figure 2. GMS PMC VGA Video Graphic Board Block Diagram

SVGA CONNECTOR

The PMC VGA Video Graphic board “Da Vinci” is attached to PMC compliant board using a SVGA Connector (DB-15 Female) as shown in Figure 3. Refer to Appendix B, Table B.1., for the SVGA Connector pin assignments.

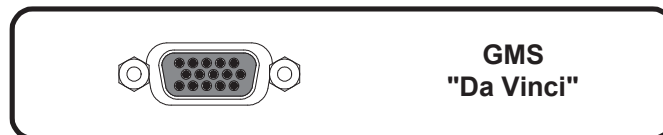


Figure 3. GMS PMC VGA Bezel

PMC INSTALLATION

The PMC VGA Video Graphic board installs in a PMC slot that supports a +5 Volts interface. A mounting illustration is shown in Figure 4 below.

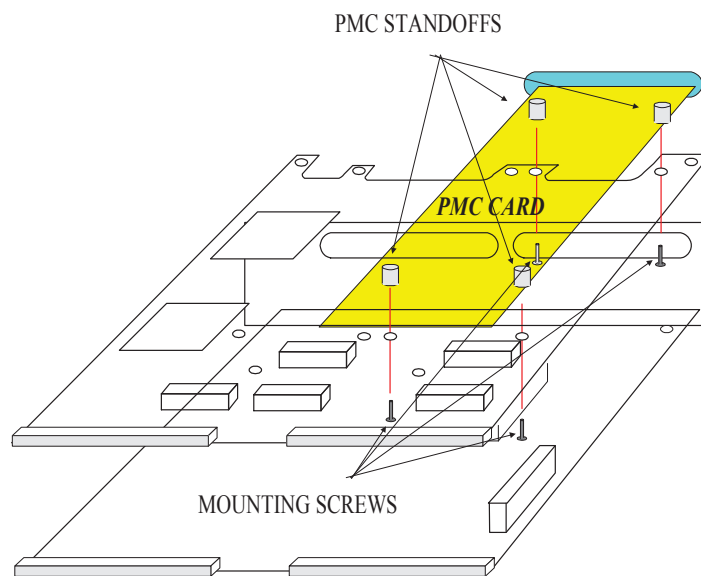


Figure 4. PMC VGA Mounting Illustration

CL-GD5446 VisualMedia™ Accelerator

OVERVIEW

The CL-GD5446 VisualMedia accelerator is a 64-bit DRAM based SVGA controller with hardware-accelerated BitBLT, video playback, and up to 4-MB RAM.

The CL-GD5446 features a 64-bit GUI BitBLT engine with double-buffered, memory-mapped control registers. Transparency is supported with color expansion for all color depths, and supported without color expansion for 8 and 16-bpp graphics mode.

Features

Table 1. Presents a list of the major features of the CL-GD5446 VisualMedia accelerator.

| Features | CL-GD5446 |
|--|--------------|
| GUI accelerator width (in bits) | 64-bits |
| Maximum dot clock | 135 MHz |
| Maximum memory clock | 80 MHz |
| Multimedia ready | Yes |
| Color key, chroma key occlusion support | Yes |
| YUV and AccuPak | Yes |
| Unique planar assist video support | Yes |
| Multi-format frame buffer | Yes |
| Color space conversion | Yes |
| Interpolated zooming (independent for X and Y) | Yes |
| Transparent source BitBLT | Yes |
| Active display line readback | Yes |
| 'Page flip' support | Yes |
| I2C support | Yes |
| 8 or 16-bit General-Purpose I/O bus | Yes |
| DDC2B support | Yes |
| 'Green PC' power-saving features | Yes |
| Direct PCI bus interface (2.1-compliant) | Yes |
| Resolutions up to 1280 x 1024 | Yes |
| Integrated triple 8-bit DAC | Yes |
| Programmable dual-clock synthesizer | Yes |
| 64-bit DRAM display memory interface | Yes |
| Memory size (Mbytes) | 2-MB or 4-MB |
| 4, 16-bit-wide DRAMs | Yes |
| EDO DRAM support | Yes |
| 128K x 16, 128K x 32 DRAM support | Yes |

| | |
|---|------------|
| 16-bit Pixel bus | Yes |
| CL-GD542X register and software-compatible | Yes |
| Low-power CMOS, 208-pin PQFP | Yes |
| 100% hardware and BIOS compatible with IBM [®] VGA display standards | Yes |
| PC97 compliance | Revision B |

Table 1. CL-GD5446 Features List

64-bit VisualMedia™ Accelerator

The CL-GD5446 delivers high-performance graphics and TV-quality, full-motion, full-screen video playback in an integrated, single-chip device. The CL-GD5446 VisualMedia™ accelerator integrated into a cost-effective personal computer, plays CD-ROM video clips and disk-based video files (including MPEG titles), in full screen at up to 30 frames per second with fully synchronized sound. At the same time, the CL-GD5446 delivers exceptional system throughput with minimal impact to system operation. Transparent BitBLT and page-flipping features provide outstanding DirectDraw™ and games performance.

The CL-GD5446 supports pixel resolutions of up to 1280 x 1024, and 16.8 million colors at resolutions of up to 1024 x 768.

The CL-GD5446 features an integrated dual-frequency synthesizer with on-chip oscillator and filters, as well as a triple 8-bit palette DAC with on-chip current reference. Green-PC power-management features help make systems based on the CL-GD5446 compliant with the Energy Star Program.

The CL-GD5446 is software and pin-compatible with the industry-standard alpine family of VGA controllers from Cirrus Logic. It comes with the same Cirrus Logic quality software, applications support, and documentation. Refer to Figure 5 for the CL-GD5446 Block Diagram.

Features

The features for the 64-bit VisualMedia™ Accelerator are explained in the following paragraphs:

- High-throughput PCI bus Interface optimized for video playback
 - Large writes buffer allows sustained zero-wait-state bursts.
 - Independent memory apertures for BitBLT and CPU/video allow concurrent operation for optimized video playback.
 - Byte-swapping for PowerPC™ support.
 - PCI v2.1-compliant.

Advanced 64-bit BitBLT engine for Windows™ 95

- Transparent source data BitBLT for DirectDraw™.
- Color expansion for all graphics modes.
- Large data buffers for fast screen-to-screen BitBLT.
- Double-buffered, memory-mapped registers with AutoStart™.
- Optimized color 8 x 8 PatCopy.
- Accelerated Packed-24 modes.
- 64-Bit DRAM interface optimized for EDO DRAM.
 - 80-MHz MCLK offers up to 320 Mbytes/sec., peak bandwidth.
 - Supports new 128K x 16, 128K x 32 DRAM.

- PC97-compliant (Revision B).
- Cirrus Logic provides enabling software drivers (visit their website www.cirrus.com/prodtech).
 - Windows® 95/98, Windows® NT 4.0, Windows NT™, OS/2®, and AutoCAD®.

Unique Features

- Outstanding VisualMedia™ Acceleration.
 - High- throughput PCI bus interface.
 - Advanced 64-bit BitBLT engine with transparent BitBLT and page-flip support.
 - Optimized EDO DRAM interface.
 - 128K x 16/32-bit DRAM interface.
- Superior TV-Like-Quality Video Performance.
 - Hardware video window.
 - X and Y linear interpolated scaling.
 - YUV planar assist, AccuPak™ encoding.
 - Multiformat frame buffer.
 - Color key, chroma key.
- Foundation for Differentiation.
 - I2C interface.

- Compatibility.
 - Compatible with VGA standards.
 - Drivers supplied at various resolutions for Windows® 95/98, Windows NT™, AutoCAD®, OS/2®, and other popular applications.

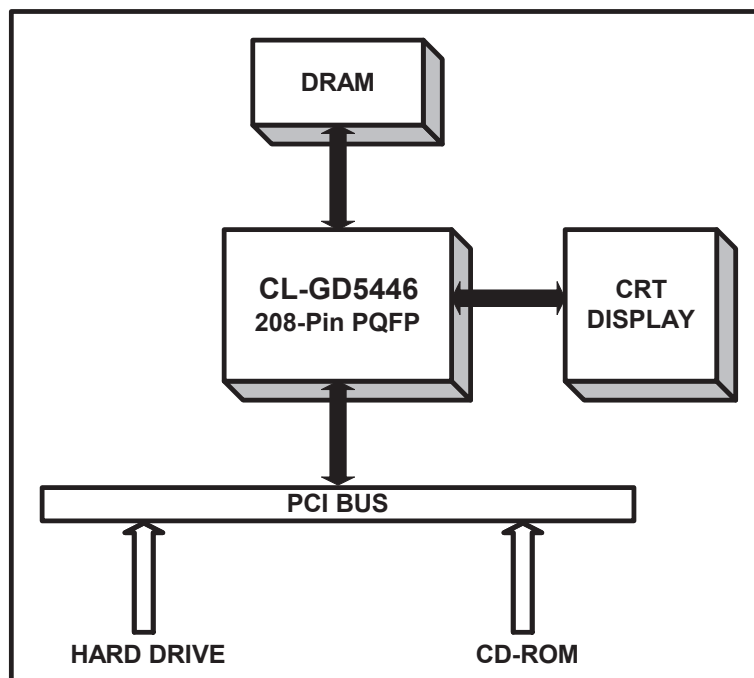


Figure 5. CL-GD5446 Block Diagram

SOFTWARE SETUP

Cirrus Logic provides an extensive and expanding range of software drivers to enhance the resolution and performance of many popular software packages. Note that the CL-GD5446 VGA graphics portion of a system does not require software drivers to run applications in standard-resolution modes. Refer to Cirrus Logic website for software setup assistance.

Cirrus Logic software drivers for the CL-GD5446 include support for the following resolutions as shown in Table 2.

| Software Drivers | Resolution Supported (Note at bottom) | Number of Colors |
|--|--|-------------------------|
| Microsoft® / Intel® DCI (display control interface), DirectDraw™ | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 256 |
| | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 65,536 |
| | 640 x 480, 800 x 600, 1024 x 768. | 16.8 million |

| | | |
|--|--|--------------|
| Microsoft® Windows® v3.x Microsoft® Windows® 95 | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 256 |
| | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 65,536 |
| | 640 x 480, 800 x 600, 1024 x 768. | 16.8 million |

| | | |
|---|--|--------------|
| Microsoft® Windows NT™ v3.5, v3.51, v4.0 | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 16 and 256 |
| | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 65,536 |
| | 640 x 480, 800 x 600, 1024 x 768. | 16.8 million |

| | | |
|-------------------------------|--|--------------|
| OS/2 [®] v2.11, v3.0 | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 256 |
| | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 65,536 |
| | 640 x 480, 800 x 600, 1024 x 768. | 16.8 million |

| | | |
|--|--|--------------|
| AutoCAD® v12.0, v13.0 AutoshADe® v2.0 with Renderman 3D Studio™ v1.0, v2.0, v3.0, v4.0 | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 16 |
| | 640 x 480, 800 x 600, 1024 x 768, 1152 x 864, 1280 x 1024. | 256 |
| | 640 x 480, 800 x 600, 1024 x 768. | 32,768 |
| | 640 x 480, 800 x 600, 1024 x 768. | 65,536 |
| | 640 x 480, 800 x 600, 1024 x 768. | 16.8 million |

Note: All monitor types do not support all resolutions; 640 x 480 drivers will run on PS/2® – type monitors. Extended resolutions are dependent upon monitor type and VGA driver for the system.

Table 2. Software Support

APPENDIX A

SYSTEM SPECIFICATIONS

This section provides hardware performance, electrical and environmental (non-operating) specifications for the PMC VGA.

Physical Specifications

Dimensions of the GMS PMC VGA assembly are provided in Table A.1.

| Dimension | Measurement |
|------------------|--------------------|
| Height | 0.650 in |
| Length | 5.865 in |
| Width | 2.912 in |

Table A.1. PMC VGA Physical Specifications

Electrical Specifications

Electrical specifications for the GMS PMC VGA assembly are provided in Table A.2.

| Characteristic | Typical Value | Maximum Value |
|---------------------------|-------------------|--------------------------------|
| Power Consumption | 4 Watts | 6 Watts |
| Supply Voltage | 5 Volts | 5.25 Volts |
| Temperature | 0 °C | 60 °C |
| Humidity (non-condensing) | 5% | 95% |
| Altitude Range | 0 feet (0 meters) | 10,000 feet (3,408 m) |
| Shock | N/A | 5 g pk, 10 msec, 1/2 sine wave |

Table A.2. PMC VGA Electrical Specifications

Environmental Specifications

Table A.3. Displays the environmental specifications for the PMC VGA board under non-operating conditions.

| Characteristic | Minimum Value | Maximum Value |
|---------------------------|-------------------|----------------------|
| Temperature | -55 °C | 150 °C |
| Humidity (non-condensing) | 5% | 95% |
| Altitude Range | 0 feet (0 meters) | 40,000 ft (12,192 m) |
| Shock | N/A | 20g pk, 30msec |

Table A.3. PMC VGA Non-Operating Specifications

APPENDIX B

CONNECTOR PIN ASSIGNMENTS

This section provides connector pin assignments for the **PMC VGA** Video mezzanine board. Refer to the Tables for the connector pin assignments.

SVGA Connector (DB-15 Female) J1 Pin Assignments

| Pin # | Description |
|-------|-----------------|
| 1 | Red |
| 2 | Green |
| 3 | Blue |
| 4 | ID2 |
| 5 | Ground |
| 6 | Ground |
| 7 | Ground |
| 8 | Ground |
| 9 | +5 Volts |
| 10 | Ground |
| 11 | ID0 |
| 12 | DATA I/O |
| 13 | Horizontal Sync |
| 14 | Vertical Sync |
| 15 | Data Clock |

Table B.1. SVGA (DB-15 Female) Connector J1

PMC1 Interface Connector J3 Pin Assignments

| Pin # | Description | Pin # | Description |
|-------|---------------|-------|---------------|
| 1 | No Connection | 33 | FRAME# |
| 2 | No Connection | 34 | Ground |
| 3 | Ground | 35 | Ground |
| 4 | No Connection | 36 | IRDY# |
| 5 | No Connection | 37 | DEVSEL# |
| 6 | No Connection | 38 | +5 Volts |
| 7 | Bus Mode 1 | 39 | Ground |
| 8 | +5 Volts | 40 | No Connection |
| 9 | No Connection | 41 | SDONE |
| 10 | No Connection | 42 | SBO# |
| 11 | Ground | 43 | PAR |
| 12 | No Connection | 44 | Ground |
| 13 | PCI CLOCK | 45 | Voltage I/O 3 |
| 14 | Ground | 46 | AD15 |
| 15 | Ground | 47 | AD12 |
| 16 | No Connection | 48 | AD11 |
| 17 | No Connection | 49 | AD9 |
| 18 | +5 Volts | 50 | +5 Volts |
| 19 | Voltage I/O 1 | 51 | Ground |
| 20 | AD31 | 52 | C/BE0# |
| 21 | AD28 | 53 | AD6 |
| 22 | AD27 | 54 | AD5 |
| 23 | AD25 | 55 | AD4 |
| 24 | Ground | 56 | Ground |
| 25 | Ground | 57 | Voltage I/O 4 |
| 26 | C/BE3# | 58 | AD3 |
| 27 | AD22 | 59 | AD2 |
| 28 | AD21 | 60 | AD1 |
| 29 | AD19 | 61 | AD0 |
| 30 | +5 Volts | 62 | +5 Volts |
| 31 | Voltage I/O 2 | 63 | Ground |
| 32 | AD17 | 64 | No Connection |

Table B.2. PMC1 Interface Connector J3

PMC2 Interface Connector J4 Pin Assignments

| Pin # | Description | Pin # | Description |
|-------|---------------|-------|---------------|
| 1 | No Connection | 33 | Ground |
| 2 | No Connection | 34 | No Connection |
| 3 | No Connection | 35 | TRDY# |
| 4 | TDO (NC) | 36 | +3.3 Volts |
| 5 | TDI (NC) | 37 | Ground |
| 6 | Ground | 38 | STOP# |
| 7 | Ground | 39 | No Connection |
| 8 | No Connection | 40 | Ground |
| 9 | No Connection | 41 | +3.3 Volts |
| 10 | No Connection | 42 | No Connection |
| 11 | No Connection | 43 | C/BE1# |
| 12 | +3.3 Volts | 44 | Ground |
| 13 | PCIRST# | 45 | AD14 |
| 14 | Bus Mode 3 | 46 | AD13 |
| 15 | +3.3 Volts | 47 | Ground |
| 16 | Bus Mode 4 | 48 | AD10 |
| 17 | No Connection | 49 | AD8 |
| 18 | Ground | 50 | +3.3 Volts |
| 19 | AD30 | 51 | AD7 |
| 20 | AD29 | 52 | No Connection |
| 21 | Ground | 53 | +3.3 Volts |
| 22 | AD26 | 54 | No Connection |
| 23 | AD24 | 55 | No Connection |
| 24 | +3.3 Volts | 56 | Ground |
| 25 | IDSEL | 57 | No Connection |
| 26 | AD23 | 58 | No Connection |
| 27 | +3.3 Volts | 59 | Ground |
| 28 | AD20 | 60 | No Connection |
| 29 | AD18 | 61 | No Connection |
| 30 | Ground | 62 | +3.3 Volts |
| 31 | AD16 | 63 | Ground |
| 32 | C/BE2# | 64 | No Connection |

Table B.3. PMC2 Interface Connector J4

NOTES:

ADDITIONAL PRODUCTS BY GMS

VME CPU MODULES

V255 - "MUSTANG II" Single/Dual Pentium MMX SBC.
V155 - "COLT" Single Slot Ultra Low Power Pentium MMX SBC.
V157 - "MARINER" Single Slot Celeron or Coppermine
- 128 Processor SBC.
V2P3 - "HYDRA" Single/Dual Pentium III/Slot-1 SBC.
V2P4 - "ATLAS" Single/Dual Coppermine - 256 Embedded Pentium
SBC.

COMPACT PCI CPU MODULES

C2P3 - "JUDGEMENT DAY" Single/Dual Pentium III / Slot-1 SBC.
C2P4 - "ATLAS" Single/Dual Coppermine - 256 Embedded Pentium
SBC.
C157 - "MARINER II" CPCI Single Slot Single Celeron or
Coppermine - 128 Processor SBC.
C130 - "ELIMINATOR" CPMC Expansion Module.

PMC MODULES

ENET 2 "NetMinder II" Support for One 10/100 Base-Tx Ethernet
with RJ-45 Front Panel Connector.
ENET 3 "NetDoubler" Support for Two 10/100 Base-Tx Ethernet
with RJ-45 Front Panel Connector.
ENET 8 "Octopus" Support for Eight 10/100 Base-Tx Ethernet with
Four RJ-45 on the Front and Four via Rear Panel.
PMC QUADSIO "Commander" QuadSync/Async Serial I/O.
PMC VIDEO "DaVinci" Hi-Performance Video with 4MB RAM.
PMC SCSI "Newton" Hi-Performance Ultra Wide SCSI Interface.
PMC ATM "RoadWarrior" Single/Multi-Mode ATM with
Fiber/Copper.

PERIPHERALS

DDrive 1 "DDrive" Support for One Floppy/LS120 and One IDE/SCSI Drive.

DDrive 2 "Mini-DDrive" Support for One Micro Floppy/LS120 and One 2.5" IDE HDD.

SOFTWARE SUPPORT

GMS supplies a variety of Drivers and Board Support Packages (BSP).

ALSO AVAILABLE

Expansion Modules, Development Systems (Chassis), Memory, SanDisk, Disk-on-Chip, CDs and Processors.

Please call 1-800-307-4863 for details. Please visit our website at: www.gms4vme.com.

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PMC VGA Procedure # 000-027-01.1

February 11, 2000

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