PMC GA4

RADSTONE MEZZANINE

- Leading OpenGL performance
- 3Dlabs Visual Processing Architecture
- 128 Megabytes SDRAM
- Two independent output channels
- VESA output resolutions to 1600x1200
- RS-170, NTSC & PAL video input
- RS-170, NTSC & PAL video output
- DVI 1.0 digital video output
- Air-cooled and rugged conduction-cooled variants
- Proven software drivers

Product Overview

PMCGA4 is the latest in a family of market-leading graphics accelerator cards designed from inception for the defense and aerospace markets. Using the 3Dlabs groundbreaking P10 Visual Processing Unit (VPU) at its core, it is capable of delivering the highest levels of performance in the rugged marketplace.

PMCGA4 is a PCI mezzanine card (PMC) compatible with industrial standard PMC-P1386.1/Draft 2.1, and is available in four ruggedization levels to cater for applications in both benign and harsh environments. The level 4 product conforms to ANSI VITA20-2001 conduction-cooled PMC specification.

The board is intended for both new programs and technology insertion for existing programs. It is pin compatible with previous Radstone graphics PMCs, and is supported by the same range of high quality software drivers.

Product Architecture

The product is based on the P10 VPU from 3Dlabs, with 128 Megabytes (MB) of local double data rate SDRAM, used for frame, Z-depth and texture buffers. The P10 VPU has an integral 370 MHz RAMDAC, capable of driving a wide range on non-interlaced monitors and flat panel displays. 128 KB of EEPROM is available for storage of board configuration, and Built-In-Test code.

A DVI 1.0 output gives high clarity digital video for driving suitable flat panel monitors, removing the need for D/A and A/D conversion stages thus improving noise immunity.

In addition, there is a wide range of video I/O standards to allow system developers to interface to systems utilizing legacy equipment. PMCGA4 is capable of acquiring or driving RS-170 (monochrome) and PAL & NTSC (color) composite or S-video interlaced formats. These are useful for camera, VCR and TV style I/O.

RADSTONE TECHNOLOGY

Why settle for less

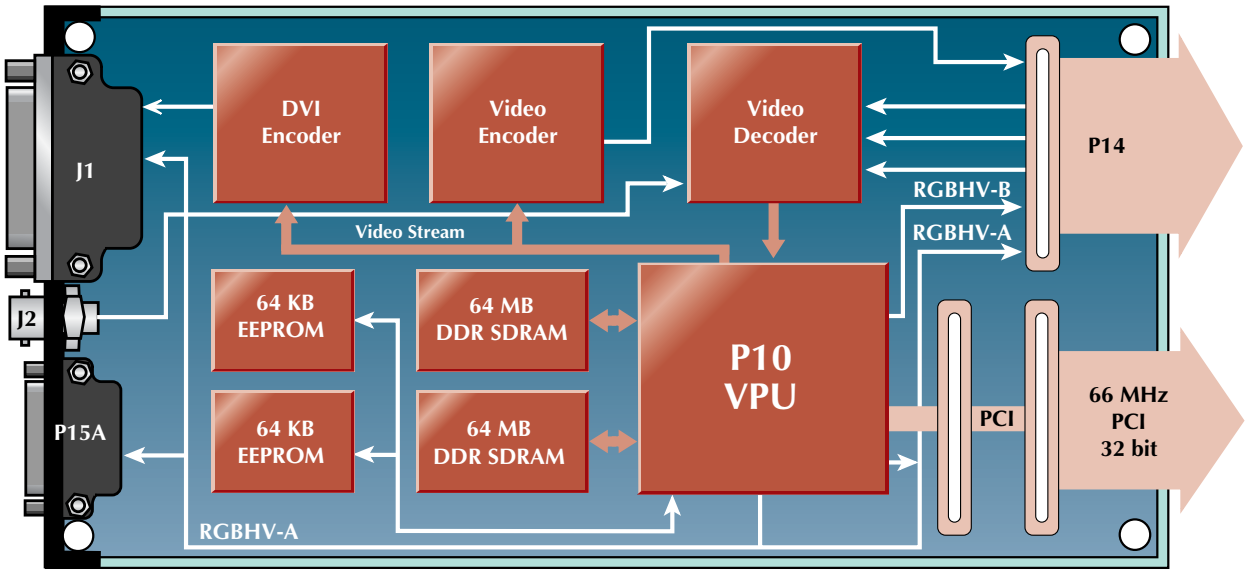


Figure 1: PMC GA4 Block Diagram

Performance

The 3Dlabs Visual Processing Architecture implements an optimized graphics pipeline, replacing previously inflexible pipeline stages with highly programmable SIMD (single instruction, multiple data) processor arrays. The P10 VPU combines over 200 SIMD processors throughout its geometry, texture and pixel processing pipeline stages to deliver over 170Gflops and one TeraOps of programmable graphics performance together with a full 256-bit DDR memory interface for up to 20GBytes/sec of memory bandwidth.

The 256-bit memory interface supports 128 MB of local memory, which is used as frame-buffer, Z-buffer and texture memory. This capacity can rise to 256 MB as higher capacity memory devices become available.

A virtual memory subsystem in the P10 VPU maps memory accesses into a full 16 GB virtual address space, enabling the PMCGA4 to break through the limitations of on-board graphics memory. Texture caching occurs within the 128 MB local memory.

Software Support

Built-In-Test

The PMCGA4 has a full suite of functional test software to integrate with the Radstone BIT software running on the host SBC. The tests are multi-level, providing a rapid power-up reset test for system integrity confidence, through to a comprehensive test suite which may be used by a trained technician in the field for system diagnostics.

X11

The PMCGA4 is supported by an X11 implementation allowing portable man-machine interfaces to be rapidly built and deployed. X11 is ideal for two-dimensional graphics applications where information is displayed for an operator in a variety of formats, ranging from text to radar data.

Additionally, the application developer can take advantage of the huge number of utilities available for this well-established industry standard. For example, in applications where different information sets are to be presented to the user, a window manager may be used to maintain individual graphics contexts for the data, thus simplifying presentation and application development.

OpenGL

OpenGL is the most widely used industry standard graphics API for both two and three dimensional graphics application development. It is a powerful, yet portable standard that may be used to readily move from development lab to deployed target, yielding significant productivity gains in the development phase of a project.

The P10 Visual Processing Unit supports the OpenGL API in hardware, allowing the host to offload the previously CPU-intensive processing to a fast, programmable, dedicated graphics pipeline.

OpenGL routines simplify the development of graphics software, from rendering a simple geometric point, line or filled polygon to the creation of the most complex lighted and texture-mapped NURBS curved surface. OpenGL gives software developers access to geometric and image primitives, display lists, modeling transformations, lighting and texturing, anti-aliasing, blending, and many other features.

OpenGL can be layered on top of X11, using the GLX extension defined by SGI to interact with the windowing sub-system.

For safety-critical applications, a subset of the OpenGL API is used that is certifiable under RTCA DO-178B. Due to certification constraints, this is implemented as a pure OpenGL subset that does not use any X11 technology.

Video I/O Capability

The PMCGA4 remains electrically compatible with its predecessors, including the PMCGA2, but has an improved video I/O capability. Its video input/output configurations are intended to suit a wide variety of possible applications.

The PMCGA4 is capable of operating both the digital input port and the digital output port of the P10 simultaneously, allowing users to build applications which have a video input, graphics overlay, and DVI or TV output.

Table 1: Video Output Resolutions

Resolution	Color Depth	Non-Interlaced Analog Refresh Rates	DVI Refresh Rates	TV
640 x 480	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	100, 85, 75, 60 Hz	PAL, NTSC
800 x 600	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	100, 85, 75, 60 Hz	PAL, NTSC
1024 x 768	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	100, 85, 75, 60 Hz	PAL, NTSC
1152 x 864	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	100, 85, 75, 60 Hz	N/A
1280 x 960	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	100, 85, 75, 60 Hz	N/A
1280 x 1024	8 bit, 16 bit, True color	100, 85, 75, 60 Hz	75, 60 Hz	N/A
1600 x 1200	8 bit, 16 bit, True color	75, 60 Hz	60 Hz	N/A

Composite Video Input

The PMCGA4 has the capability to input analog composite video and/or S-video from a PAL, NTSC or RS-170 video source. Up to four video sources may be connected to the card, one of which may be selected (under software control) for input.

Once enabled, the decoded video data streams into local DDR SDRAM with minimal overhead on the P10, the host CPU or its PCI bus. As each complete frame is received, it may be used as an underlay for the graphics plane generated by the P10.

The video decoder is enabled under software control, and is held in reset when not being used.

Composite Video Output

The PMCGA4 has the capability to drive PAL, NTSC or RS-170 composite and/or S-video output, and may be enabled under software control. This video output functionality allows integration of the PMCGA4 in legacy systems that use displays based on TV broadcast standards.

The composite video output may be used simultaneously with the analog output, at suitable resolution.

Digital Video Output

The PMCGA4 has a DVI 1.0 compliant encoding device connected to the digital video output port of the P10. As use of flat panel displays becomes more common, a great quality improvement can be achieved, by removing the digital-to-analog and analog-to-digital conversion stages, thus ensuring that spurious noise does not compromise the signal quality.

The TV and DVI encoder is enabled under software control, and is held in reset when not being used.

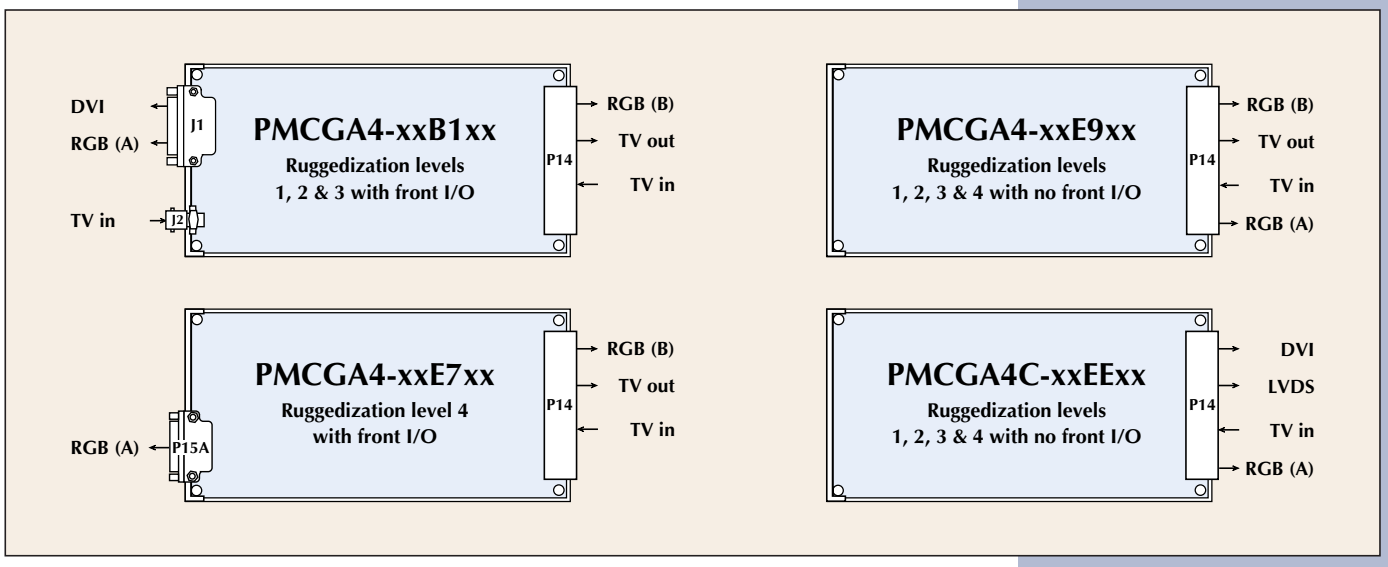
The DVI output may be used simultaneously with the analog output. Note, that encoding to TV format is not recommended while simultaneously encoding to DVI.

Connectivity

The PMCGA4 is electrically compatible with previous Radstone products, and has most of its functionality available for use in either PMC site on a Radstone single board computer. Note that on some Radstone motherboards, only pins 1-46 of the PMC P14 user I/O are supported in the second PMC site.

Table 2: Connector Types

J1	DVI combined analog RGBHV & digital
J2	BNC
P14	PMC I/O connector
P15A	Micro 15-way D-type



Specification

Graphics accelerator	3Dlabs P10 VPU, 66 MHz 32-bit PCI interface
Memory	128 MB DDR SDRAM, 256-bit memory interface; 128 KB FLASH
DVI encoder	Chrontel CH7010A
Video encoder	Chrontel CH7010A
Video decoder	Philips SAA7114

Ordering Information

PMCGA4-13B1v0	Level 1; 128 MB RAM (dual bank), 128 KB EEPROM; Unfiltered rear TV input; Front TV input fitted; TV output rear output (via P14 (1-46)); DVI front output (J1); Analog VGA A front output (J1); Analog VGA B rear output (via P14 (1-46)); +3v3 generated locally; BIT
PMCGA4-23B1v0	Level 2; As above
PMCGA4-33B1v0	Level 3; As above
PMCGA4-43E7v0	Level 4; 128 MB RAM (dual bank), 128 KB EEPROM; Unfiltered rear TV input; Front TV input not fitted; TV output rear output (via P14 (1-46)); DVI not fitted; Analog VGA A front output (P15A); Analog VGA B rear output (via P14 (1-46)); +3v3 generated locally; BIT
PMCGA4-13E9v0	Level 1; 128 MB RAM (dual bank), 128 KB EEPROM; Unfiltered rear TV input; Front TV input not fitted; TV output rear output (via P14 (1-46)); DVI not fitted; Analog VGA A rear output (via P14 (47-64)); Analog VGA B rear output (via P14 (1-46)); +3v3 generated locally; BIT
PMCGA4-23E9v0	Level 2; As above
PMCGA4-33E9v0	Level 3; As above
PMCGA4-43E9v0	Level 4; As above
PMCGA4C-13EEA0	Level 1; 128 MB RAM (dual bank), 128 KB EEPROM; Unfiltered rear TV input; Rear TV output (via P14 (1-46)); Rear DVI output (via P14 (1-46)); Rear LVDS output (via P14 (1-46)); Analog VGA A rear output (via P14 (1-46)); 66 MHz, +3V3 (5V intolerant) PMC-VIO; BIT
PMCGA4C-23EEA0	Level 2; As above
PMCGA4C-33EEA0	Level 3; As above
PMCGA4C-43EEA0	Level 4; As above
Where 'v' is:	
F	66 MHz, +3V3 (5V intolerant) PMC-VIO
K	33 MHz, +5V PMC-VIO

Cable Accessories

ARACC-3VG A2	DVI-A to VGA, 2 metre monitor cable.
ARACC-3DVID2	DVI-D to DVI-D, 2 metre monitor cable

UK
Radstone Technology
Tove Valley Business Park
Towcester
Northants NN12 6PF
Telephone: +44 (0) 1327 359444
Facsimile: +44 (0) 1327 322800
E-mail: sales@radstone.co.uk

USA
Radstone Technology Corporation
50 Tice Boulevard
Woodcliff Lake, NJ 07677-7645
Telephone: +1 800 368-2738
Facsimile: +1 (201) 391-2899
E-mail: sales@radstone.com

Eastern Region: +1 (201) 391-2700
North Central Region: +1 (2978) 399-0195
Central Region: +1 (480) 964 5407
Western Region: +1 (909) 974-1141

Helpdesk: +44 (0) 1327 322760
E-mail: support@radstone.co.uk

http://www.radstone.com

CANADA
Interactive Circuits and Systems
5430 Canotek Road
Ottawa, Ontario
K1J 9G2
Telephone: +1 (613) 749-9241
Facsimile: +1 (613) 749-9461
Toll free (US Only) 800-267-9794
E-mail: info@ics-ltd.com
http://www.ics-ltd.com

RADSTONE
TECHNOLOGY

Printed in UK Publication RT271 5K02/2003