PMCGA3

PCI Graphics Accelerator

- Leading OpenGL performance
- 3Dlabs Visual Processing Architecture
- 64 MBytes 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

RADSTONE
DIGITAL PROCESSING

PMCGA3 is the latest in a family of market-leading graphics accelerator cards designed from inception for the defense and aerospace markets, delivering exceptional levels of drawing performance. Available in four ruggedization levels, PMCGA3 caters for applications in benign and harsh environments, and is available in front and rear I/O configurations.

The product 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.

PMCGA3 is based on the P9 VPU from 3Dlabs, with 64 MBytes of local double data rate SDRAM, used for frame, Z-depth and texture buffers. The VPU has an integral 370 MHz RAMDAC, capable of driving a wide range of non-interlaced monitors and flat panel displays. A DVI 1.0 output gives high clarity digital video for driving suitable flat panel monitors.

In addition, a wide range of video I/O standards allows system developers to interface to systems utilizing legacy equipment. PMCGA3 is capable of acquiring or driving RS-170, NTSC & PAL formats. These are useful for camera, VCR and TV-style I/O.

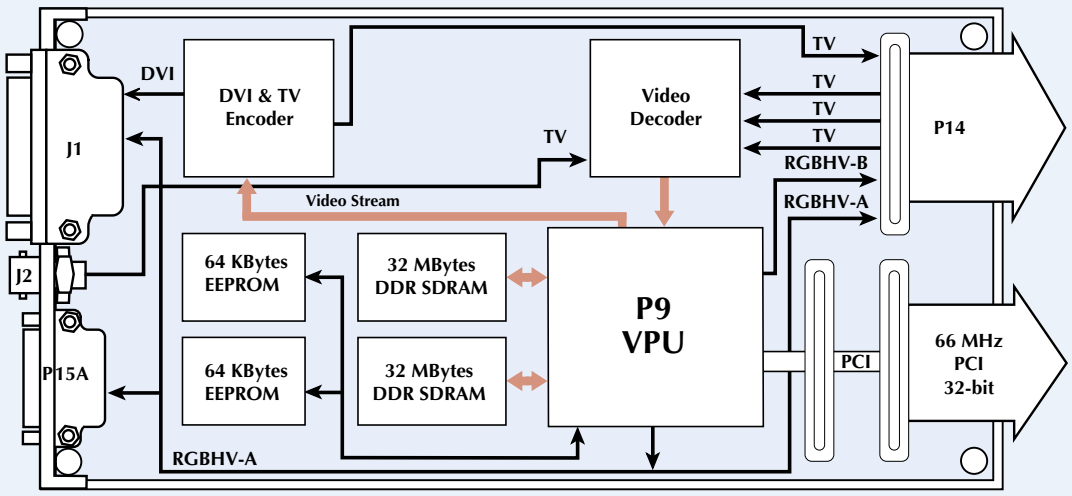


Figure 1: PMCGA3 Functional Block Diagram

Performance

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 P9 VPU combines over 100 SIMD processors throughout its geometry, texture and pixel processing pipeline stages to deliver over 170 Gflops and one TeraOp of programmable graphics performance together with a full 128-bit DDR memory interface for up to 17 GBytes/sec of memory bandwidth.

The 128-bit memory interface supports 64 MBytes of local memory, which is used as frame-buffer, Z-buffer and texture memory. This capacity can rise to 128 MBytes as higher capacity memory devices become available.

A virtual memory subsystem in the P9 VPU maps memory accesses into a full 16 GBytes virtual address space, enabling PMCGA3 to break through the limitations of onboard graphics memory. Texture caching occurs within the 64 MBytes local memory.

Software Support - Built-in Test (BIT)

PMCGA3 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 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- PMCGA3 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 P9 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 subsystem.

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

PMCGA3 remains electrically compatible with its predecessors, including PMCGA2, but has an improved video I/O capability. Its video input/output configurations are intended to suit a wide variety of possible applications.

PMCGA3 is capable of operating both the digital input port and the digital output port of the P9 simultaneously, allowing users to build applications which have a video input, graphics overlay, and DVI or TV output.

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

Table1: Video Output Resolution

Composite Video Input - PMCGA3 has the capability to input analog composite video and S-video from a PAL, NTSC or RS-170 video source. Up to four video sources may be connected to the card, and one of these sources may be selected (under software control) for input. Once enabled, the decoded video data streams into local DDR SDRAM with minimal overhead on the P9, 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 P9.

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

Composite Video Output - PMCGA3 has the capability to drive PAL, NTSC or RS-170 composite or S-video output, and may be enabled under software control. This video output functionality allows integration of PMCGA3 in legacy systems that use displays based on TV broadcast standards.

Digital Video Output - PMCGA3 has a DVI 1.0 compliant encoding device connected to the digital video output port of the P9. 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.

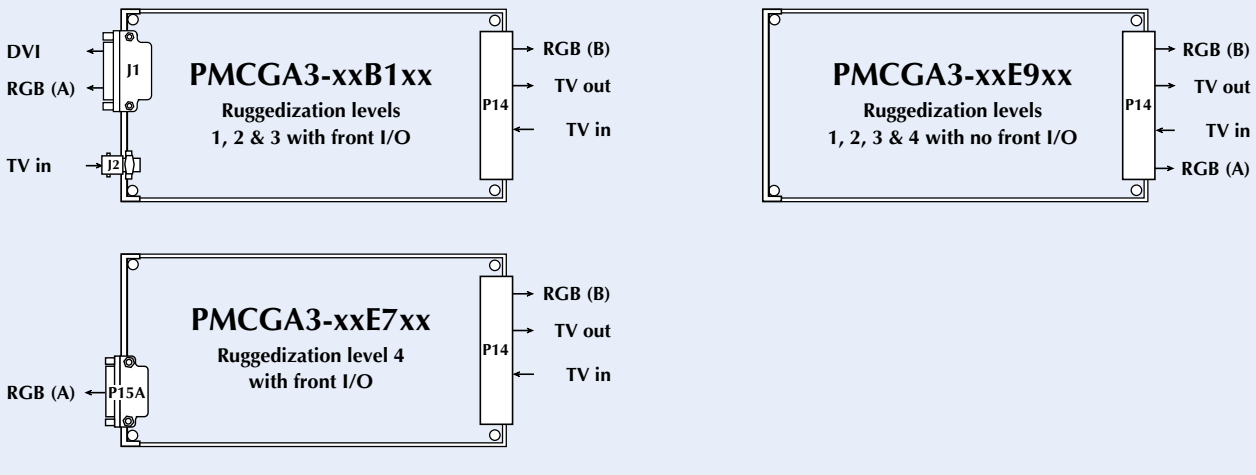
Note that encoding to TV format is not possible while simultaneously encoding to DVI.

Connectivity

PMCGA3 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.

J1	DVI combined analog RGBHV & digital
J2	BNC
P14 (46)	PMC connector - using 46 signals, suitable for use in either PMC site
P14 (64)	PMC connector - using 64 signals, suitable for use in site 1
P15A	Micro 15-way D-type

Table 2: Connector Types



Specification

Graphics accelerator	3Dlabs P9 VPU, 66 MHz 32-bit PCI interface
Memory	64 MBytes Double Data Rate SDRAM 128 KBytes Flash
DVI encoder	Chrontel CH7010B; DVI 1.0
Video encoder	Chrontel CH7010B; PAL, NTSC, RS-170 input
Video decoder	Philips SAA7114; PAL, NTSC, RS-170 output
Conformance	PMC1386.1/Draft 2.1; CCPMC Draft VITA 20-199X
Software	OpenGL, X11, WindML

Standard Ordering Information

PMCGA3-1AB1v0	Level 1; 64 MBytes RAM (dual bank), 128 KBytes 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
PMCGA3-2AB1v0	Level 2; As above
PMCGA3-3AB1v0	Level 3; As above
PMCGA3-4AE7v0	Level 4; 64 MBytes RAM (dual bank), 128 KBytes 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
PMCGA3-1AE9v0	Level 1; 64 MBytes RAM (dual bank), 128 KBytes 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
PMCGA3-2AE9v0	Level 2; As above
PMCGA3-3AE9v0	Level 3; As above
PMCGA3-4AE9v0	Level 4; As above
Where 'v' is:	
F	66 MHz, +3V3 (5V intolerant) PMC-VIO
K	33 MHz, +5V PMC-VIO

Standard Ordering Information

ARACC-3VGA2	DVI-A to VGA, 2 meter monitor cable
ARACC-3DVID2	DVI-D to DVI-D, 2 meter monitor cable

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