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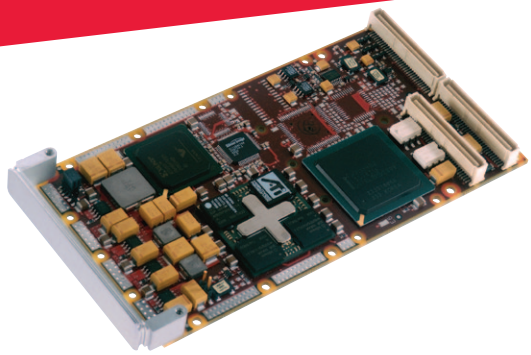




Data Sheet

PMC-704

Dual Independent Graphics Input/Output PMC



Features

- AMD (ATI) Technologies RADEON™ Mobility 9000 Visual Processor Unit with
  - 64 Mbytes integrated high-speed DDR SDRAM
  - Integrated NTSC/PAL, TMDS, LVDS video output
  - Hardware OpenGL acceleration
- Dual independent video capture capabilities (see note)
  - Dual Analog capture
    - Selectable NTSC, PAL, RS-170, and S-Video
    - RGB analog capture including RS-343, RS-170, STANAG Class A, B, C and VGA
  - LVDS digital capture
    - OpenLDI
    - FlatLink
- Dual independent Analog and Digital video output
  - NTSC, PAL, RS-170, RS-343, STANAG 3350 Class A, B, C and S-Video
  - Non-Interlaced analog
  - LVDS supporting OpenLDI and FlatLink
  - DVI/TMDS
- External Sync input support (Genlock)
- Analog outputs support separate horizontal & vertical, composite or sync on red/green/blue
- Our Video Capture and Format (VCF) module for custom video mode support
- Simultaneous real-time video capture, overlay and display
- Comprehensive Graphics Software Suite comprising:
  - Optimized full X11 Server with Extensions
  - Optimized OpenGL 1.3 driver
  - Extensive video capture and output mode support
  - Host development support for Microsoft Windows and Solaris (SPARC)
- Comprehensive Operating System support
  - Wind River VxWorks
  - Green Hills INTEGRITY
  - Linux (call for availability)
- PCI rev 2.1 compliant, 32-bit 33/66Mhz capable
- Voltage requirements: +5v and +/- 12v
- Available in all ruggedization levels

Note: Contact your local representative for specific input and output combinations

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Overview

PMC-704 is a PCI Mezzanine Card (PMC) form factor, ruggedized, high-performance, feature rich Graphics PMC. This IEEE 1386.1 Graphics PMC will provide a platform for customers to design, develop and deploy high-performance graphics sub-systems capable of supporting synthetic graphics and video overlay output as well as analog and digital capture. With support for both legacy and new video interfaces, PMC-704 is an ideal solution for both new and retrofit ground, naval and avionics platforms.

PMC-704 and PMC-706 are the first rugged COTS PMCs to make use of the AMD (ATI) Radeon Mobility 9000 (M9) Visual Processing Unit (VPU). By incorporating the ATI M9 graphics controller, we are able to leverage AMD's extensive experience in developing and producing graphics controllers for the embedded, mobile and desktop markets. The M9 features integrated memory, low power optimizations, integrated video input and output, advanced de-interlacing hardware and 2D/3D/Video acceleration.

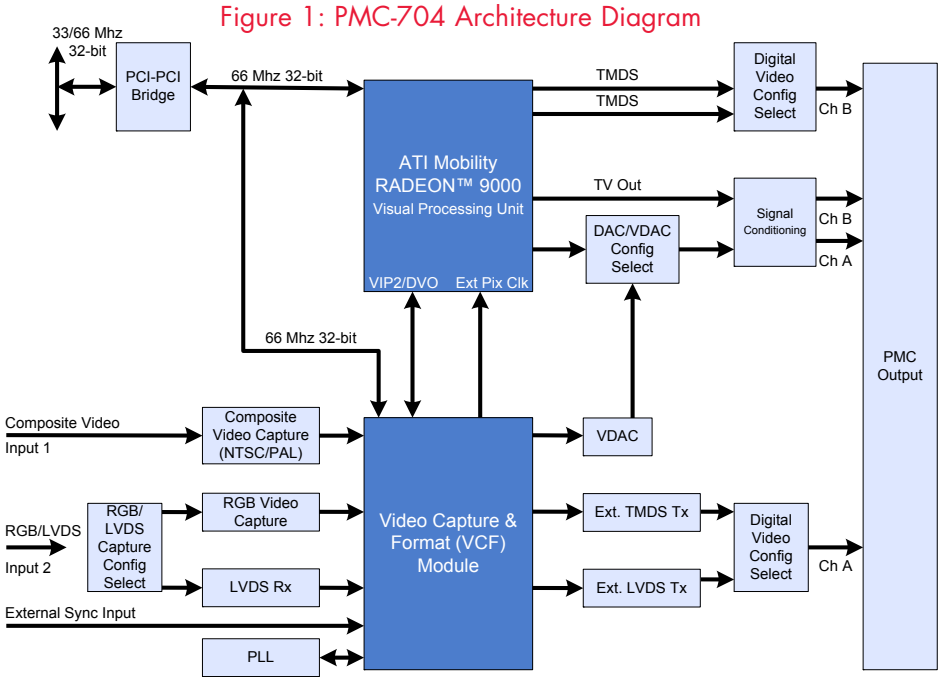
The PMC-704 combines the M9's feature/integration mix with our proven ability to produce high-performance rugged graphics products interfacing to today's emerging and established standards in Defense and Aerospace display/ sensor systems.

The PMC-704 is targeted at applications requiring high-speed presentation of synthetic graphics where the output may optionally be required to be overlaid with captured video. PMC-704 can output to up to two independent digital/analog displays and accept up to two independent video inputs. Software support is provided through our Graphics Software Suite which includes a full embeddable X11 server, OpenGL, and an extensive video capture library. This is offered for multiple RTOS environments and is optimized to provide maximum performance and reliability.

Through the onboard Video Capture and Format (VCF) module, PMC-704 can accommodate many video input and output formats often found in retrofit environments. Non-standard video formats and synchronization timing are all handled through the onboard VCF.

From head down displays, to target-and-acquisition displays, to moving map displays, to helmet mounted displays, our graphics PMC's, Imaging Platforms and Graphics Software Suite are the ideal graphics foundation for today's demanding defense & aerospace graphics and imaging platforms.

Figure 1: PMC-704 Architecture Diagram



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AMD (ATI) Mobility Radeon™ 9000 (M9)

PMC-704 is powered by the AMD (ATI) Radeon Mobility 9000 (M9) Visual Processing Unit (VPU). AMD is the market leader in mobile graphics providing graphics processors to the premier mobile computing suppliers such as Dell, IBM, Sony and Toshiba. The M9's integrated feature set, performance and flexibility are unparalleled in the embedded graphics market. Some of the M9 features include:

- Graphics Clock: 250MHz
- Integrated Memory: 64MB DDR SDRAM, 128-bits wide, 200MHz clock speed
- Video Output capabilities
  - Integrated LVDS
  - Integrated TV output (NTSC, PAL)
  - Integrated TMDS/DVI
  - High 2D/3D resolution (up to 2048 x 1536)
  - Color depth of 16.7M colors
- Integrated Digital Video Input port (VIP2)

The M9 delivers performance coupled with low power consumption in the most integrated VPU package on the market today.

Video Output

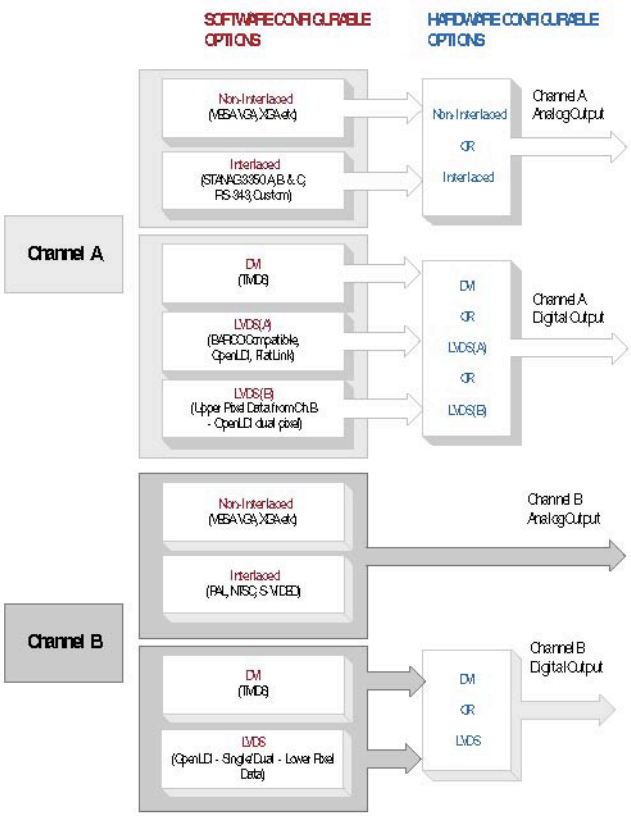
PMC-704 provides a variety of video output capabilities. Both analog (non-interlaced or interlaced) and digital (DVI or LVDS) can be presented simultaneously in real-time.

PMC-704 offers true dual channel video output support capable of driving two (2) independent analog and digital channels from the same PMC. Most of video output modes are selected through runtime software configuration (see the Video Output Configuration Options Diagram).

Analog Non-interlaced Video Output

PMC-704 provides two independent non-interlaced RGB analog output with separate and composite horizontal and vertical syncs. These outputs support non-interlaced video standards from 640 x 480 to 1600 x 1200 at various refresh rates. Our Graphics Software Suite allows the user to easily select the desired resolution and refresh rate from an extensive list of supported modes as illustrated in Table 1. PMC-704 can also be configured to provide a composite sync on the green, red or blue signal of channel A or B.

Figure 2: PMC-704 Video Output Configuration Options



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Analog Interlaced Video Output

PMC-704 provides two interlaced analog video output comprised of RGB and separate horizontal and vertical syncs. PMC-704 can be configured to provide a composite sync on the red, green or blue signal and supports the following output formats:

- NTSC
- S-Video
- PAL
- RS-170
- STANAG 3350, class A, B, and C
- RS-343

Digital DVI Output

PMC-704 provides two high-speed industry standard Digital Visual Interface (DVI) video outputs that are compatible with many commercially available digital monitors.

DVI is also known by the trade name Panel-Link® and employs Transition Minimized Differential Signaling (TMDS) technology. PMC-704 DVI outputs utilize a four differential pair interface supporting display resolutions up to 1280 x 1024 at a 60 Hz refresh rate. Note that DDC is not supported on either DVI output. Using DVI, displays or other receiving electronics such as video mixers can be readily constructed using off-the-shelf support devices, saving the time and expense of designing proprietary solutions. One of the TMDS interfaces is implemented through our VCF module while the other is implemented via the M9.

Digital LVDS Output

PMC-704 provides two outputs, each offering five (5) pairs of Low-Voltage Differential (LVDS) signaling, to enable the transmission of video data in digital form.

The LDVS interface is compatible with various video protocols including FlatLink and OpenLDI. One of the LVDS interfaces is implemented through our VCF module while the other is implemented in the M9. Our VCF supports interfaces such as those found on BARCO displays and allows different LVDS digital video protocols to be accommodated. Contact your local representative directly should you require this service.

The two (2) independent digital outputs may be configured to support single-pixel LVDS with resolutions up to 1024 x 768 @ 60Hz. Dual-pixel LVDS with resolutions up to 2048 x 1536 @ 60Hz on one channel can also be supported.

Video Input Capabilities

PMC-704 also provides a variety of video input capabilities. Both analog (non-interlaced or interlaced) and digital (LVDS) video can be captured in real-time.

PMC-704 offers dual channel video input support capable of capturing two (2) independent analog composite or RGB and digital channels from the same PMC. Most of the video input modes are selected through runtime software configuration (see the Video Input table for specific input mode options). Captured video images can be overlaid with dynamic graphical images programmed using our Graphics Software Suite.

Although the PMC-704 is capable of many video input and capture modes, final characterization of specific modes of operation should be discussed with Curtiss-Wright and/or characterized with your specific application and hardware.

Snapshot

Frame capture to PCI-accessible basecard memory is also supported. This functionality is application and video mode dependent as it can be quite bandwidth intensive. Contact your local technical representative to review this feature of the PMC-704 against your requirements.

Analog Video Input

PMC-704 provides NTSC, PAL, RS-170 (single ended), S-Video and RS-343 video inputs. All are software selectable in real-time to enable video capture from the selected channel.

Digital Video Input

PMC-704 supports a five (5) LVDS pair digital video capture interface. The LVDS interface is compatible with various video protocols including FlatLink and OpenLDI, Single Pixel, Unbalanced Mode. The LVDS interface is implemented through our VCF and therefore allows different LVDS digital video protocols to be accommodated. Contact us directly should you require this service.

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Dual Video Input

The M9's VIP2/DVO interface is a bi-directional port which is used for both input and output on the PMC-704. When this port is used for input, certain video output modes are not available. Specifically, if both Video Input 1 and Video Input 2 are active simultaneously, then Channel A Digital and Analog Interlaced outputs are not available. Conversely, when this port is used for output, capture is only possible from a single source.

Figure 3: PMC-704 Video Input Configuration Options

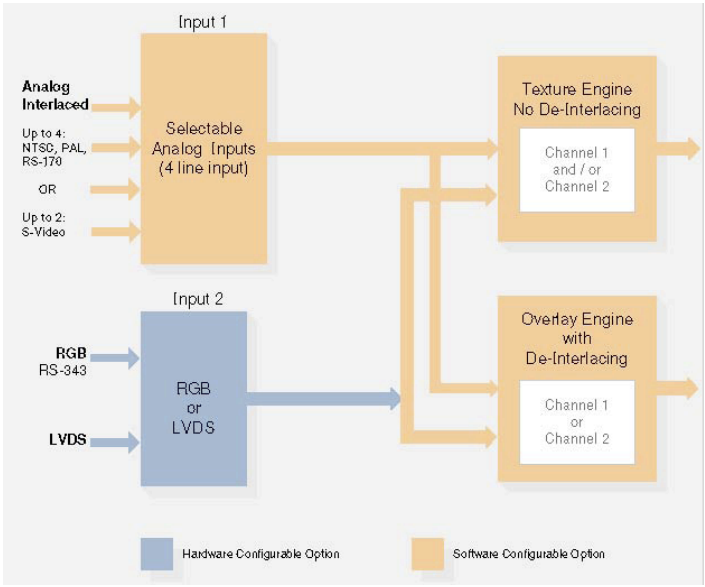


Table 1: PMC-704 Video Output Modes**

Video Mode	Resolution	Refresh Freq. (Hz)	Color Depth (bits)*	Output Channel	Notes
Analog Non-Interlaced	640 x 480	60, 75, 85, 100	16, 32	A, B	-
	800 x 600	60, 75, 85, 100	16, 32	A, B	-
	1024 x 768	60, 75, 85, 100	16, 32	A, B	-
	1152 x 864	60, 75, 85, 100	16, 32	A, B	-
	1280 x 1024	60, 75, 85, 100	16, 32	A, B	-
	1600 x 1200	60, 75	16, 32	A, B	-
Analog Interlaced	RS-170 640 x 480	30	16, 32	A	-
	RS-343 875 Line	30	16, 32	A	-
	PAL	25	16, 32	B	-
	NTSC	30	16, 32	B	-
	S-Video (Y/C)	30	16, 32	B	-
	STANAG 3350 Class A	60	16, 32	A	-
	STANAG 3350 Class B	50	16, 32	A	-
	STANAG 3350 Class C	60	16, 32	A	-
	Custom Mode Support	60	16, 32	A	3
Digital DVI (TMDS)	up to 1280 x 1024	60	16, 32	A, B	-
	1600 x 1200	60	16, 32	A	-
Digital LVDS (OpenLDI/FlatLink)	up to 1024 x 768	60	16, 32	A, B	2
	up to 2048 x 1536	60	16, 32	A, B	1
	Barco LVDS	-	-	A	-
	Custom Mode Support	-	-	A	-

Notes:
1. Dual Pixel mode (single display output only); NRE required
2. Max pixel clock rate of 65Mhz on Channel A
3. Supported through the integrated Video Capture and Format (VCF) module
*All Video is output at 24 bits of RGB color depth
**Call to confirm refresh rates

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Table 2: PMC-704 Video Input Modes**

Video Mode	Resolution	Refresh Freq. (Hz)	Color Depth (bits)*	Input Channel	Notes
Analog Non-Interlaced (RGB)	640 x 480	60, 75, 85	16, 32	2	2
	800 x 600	60	16, 32	2	2
	1024 x 768	60	16	2	2
	1280 x 1024	60	16	2	2
Analog Interlaced	RS-170 640 x 480	30	16, 32	1, 2	-
	RS-343 875 Line	30	16, 32	2	-
	PAL 768 x 575	25	16	1	-
	NTSC	30	16	1	-
	S-Video	30	16	1	-
	STANAG 3350 Class A	60	16, 32	2	-
	STANAG 3350 Class B	50	16, 32	2	-
	STANAG 3350 Class C	60	16, 32	2	-
	Custom Mode Support	60	16, 32	1, 2	1
Digital LVDS (OpenLDI/FlatLink)	640 x 480	60, 75, 85	16, 32	2	2
	800 x 600	60	16, 32	2	2
	1024 x 768	60	16	2	2
	Custom Mode Support	-	-	2	1

Notes:
1. Supported through the integrated Video Capture and Format (VCF) module.
2. Bandwidth dependent. Contact Curtiss-Wright to confirm support for your requirements.
** Call to confirm refresh rates

Synchronization

External Sync

An external composite or separate sync input is supported to allow the synchronization of the one of the graphics outputs to a system master sync or to another graphics generating module. This feature is typically required in systems supporting multiple displays where visual artifacts will be evident if adjacent displays are not refreshed at the same time.

Sync On Green

Just as with the PMC-702, PMC-704 supports the insertion of a composite sync signal on both of the non-interlaced and interlaced analog video outputs. This sync signal can be inserted on either the green channel, or in the case of certain video standards, the Red, Green and Blue channels. The sync on green feature is commonly required for interlaced displays, removing the need for separate horizontal and vertical syncs.

Video Capture and Format Module (VCF)

Our 25+ years in graphics and imaging products has led to the development of the Video Capture and Format module technology. The VCF on the PMC-704 provides support for various video capture capabilities, external sync, digital mixing, Barco LVDS and other video mode support such as STANAG Class A, B and C. The VCF also allows us to support many non-standard video input and output modes often found in many deployed video subsystems. Custom video mode support through the VCF is provided as a value added service. Contact your representative for more information.

Built-In-Test (BIT)

BIT for PMC-704 is provided by firmware routines within our Card Level Diagnostics (CLD) package. CLD is part of the Foundation Firmware suite of firmware components delivered in the Flash memory of our SBCs.

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Video I/O Breakout Module

The PMC-704 routes all it's I/O through the Pn4 connector, which in turn is routed to the P0 or P2 connector of the host board. For development, it can be more convenient to have the I/O signals available at the front panel of the system. To accommodate customers who would prefer to have front panel access to the PMC-704 I/O signals, a Front-Pack module is available separately. The FrontPack is a PMC form-factor module that is interposed between the basecard and the PMC-704. The FrontPack redirects the I/O signals to industry-standard RCA, DVI and 15-pin D-type (VGA) connectors located at the front panel. With the FrontPack installed, the assembly will intrude into the adjacent slot. The FrontPack is intended for development use and is not qualified for rugged applications.

Graphics Software Support

Graphics software support is offered through our Graphics Software Suite (GSS). We have designed and provide support for the GSS to ensure the highest level of integration with the graphics and hardware. Windows and Solaris hosted development environments are supported as are a number of target system RTOS' such as INTEGRITY, VxWorks and others. See the Graphics Software Suite datasheet for complete details.

The Graphics Software Suite for PMC-704 offers:

- OpenGL Graphics Interface:
  - OpenGL v1.3 driver and libraries
  - Multi-window capabilities (i.e. multiple OpenGL windows under VxWorks)
  - Snapshot video capture and output support
  - Configuration libraries and utilities to allow the setting of the configuration parameters
  - Comprehensive documentation set
  - Supported under the Green Hills INTEGRITY and Wind River VxWorks RTOS'
- X11 Server:
  - Full X11 R6.4 server, libraries, etc.
  - Multi-window capabilities (i.e. multiple X windows)
  - Configuration utilities to allow the setting of the configuration parameters
  - Video capture capabilities through Xv
  - GLX extension to allow integration with the OpenGL Graphics Interface
  - Other X11 extensions
  - Comprehensive documentation set
  - Supported under the Green Hills INTEGRITY and Wind River VxWorks RTOS'

Table 3: Specifications

Ruggedization Levels		
SPMC card	Available in levels 0 and 100	
DPMC card	Available in levels 100 and 200	
Power Requirements (estimates)		
+5 V	1.5 A (typical)	2.1 A (maximum)
+12V	70mA (typical)	80mA (maximum)
-12V	55mA (typical)	60mA (maximum)
Dimensions		
	Size	Weight
SPMC card	Per IEEE 1386.1	133 g
DPMC card	Per IEEE 1386.1 (ANSI/VITA 20-2001)	120 g

*Refer to Ruggedization Guidelines for more details.

Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative:

Website: www.cwcdefense.com/sales

Email: defensesales@curtisswright.com

Technical Support

For technical support:

Website: www.cwcdefense.com/support

Email: support@curtisswright.com

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