

# Rastergraf

# ArgusPMC

Dual Channel High Resolution  
Graphics Controllers with  
Video Digitizers, USB 2.0, and Audio  
for PMC

Solaris ■ Windows ■  
Real-Time Operating Systems ■ Linux



## Features

- Functions as a dual-channel multi-media controller
- Dual independent 128-bit graphics controllers provide no-compromise drawing engine performance at up to 1920 x 1200 (VGA) or 1600 x 1200 (DVI)
- 16 MB display memory per channel
- Dual video digitizers
- USB-2.0 Host controller
- Stereo Audio controller (CODEC)
- VxWorks, Linux, LynxOS, Solaris and Windows 2K/XP

*Rastergraf - graphics and PMC carriers for embedded systems*

# ArgusPMC

Rastergraf's ArgusPMC fulfills high performance requirements for a complete, dual channel graphics and audio/video acquisition solution for embedded computing processing environments. Software support is available for Solaris, Linux, Windows, and real-time operating systems such as VxWorks and LynxOS.

Using two 128-bit Borealis graphics accelerators, the Argus supports independent 2D/3D/OpenGL/DirectX compatible displays with screen resolutions up to 1920 x 1200 with up to 16.7 million colors (32 bpp). Monitor support includes analog VGA and Sync On Green (SOG) plus digital (DVI).

A quad-image VGA/FCode BIOS enables the Argus to operate in virtually any x86 or SPARC system using VGA, Sync-On-Green, or DVI displays.

Other features of the Argus include dual Conexant Fusion 878A video digitizers, an NEC uPD720101 USB 2.0 host controller, and Micronas UAC3556B Stereo Audio Controller (CODEC).

An asynchronous PCI bridge supports all PMC interfaces from 32-bit, 33 MHz to 64-bit, 66 MHz, while enabling the Borealis graphics accelerators to always operate at 32-bit, 66 MHz. The

33 MHz PCI digitizers and USB 2.0 are decoupled from the graphics PCI bus by a secondary bridge.

## Embedded Life-Cycle Support

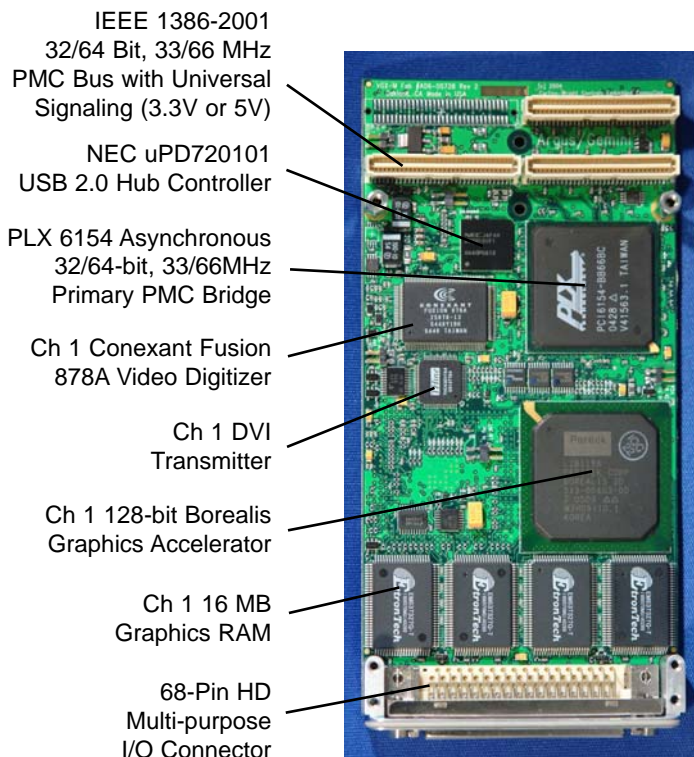
Rastergraf's comprehensive selection of PMC, CompactPCI, PCI, and VME display and carrier solutions are designed to satisfy the product life-cycle requirements demanded by the embedded computing market.

## The Embedded Graphics Source.

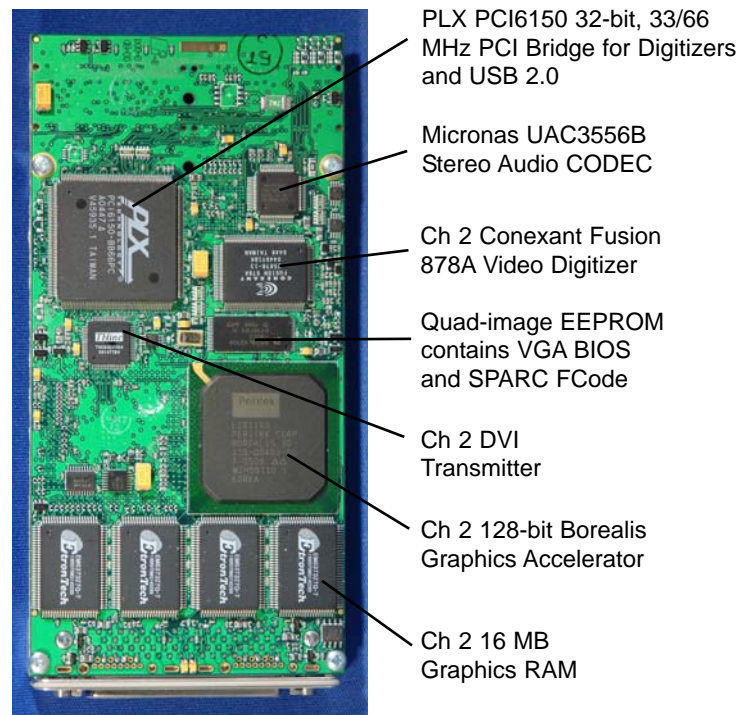
Rastergraf products include:

- Single, dual, and quad display-only PMC.
- Single and dual display/capture with audio I/O PMC
- Single display-only CPCI and PCI
- 3U and 6U VME graphics boards.
- CompactPCI and PCI carriers for one or two PMCs.

Please contact Rastergraf for more information or consult our web page at [www.rastergraf.com..](http://www.rastergraf.com..)



Top View



Bottom View

## Features

- Dual Borealis 128-bit 2D/3D graphics controllers
- 33/66 MHz, 32/64-bit PCI interface
- Each display programmable for 8, 16, or 32 bits/pixel
- Each controller has 16 MB SGRAM
- Analog (RGB) resolution up to 1920 x 1200
- Optional DVI up to 1600 x 1200
- OpenGL 1.1 in Hardware
- Hardware scroll, pan, and cursor
- VGA and FCode BIOS support on Channel A
- USB 2.0 host controller
- Dual Multi-input Video Digitizers
- Thermal sensor allows monitoring of board temperature
- USB, Digitizers, & Bridges have Vital Product Data EEPROMs
- Single channel version (Sirena)
- Single (Eclipse3) and dual (Gemini) display-only versions
- Can be used with Rastergraf PCI and CompactPCI carriers

# ArgusPMC Technical Overview

## Introduction

The Rastergraf ArgusPMC is a PMC (PCI Mezzanine Card) multifunction display controller. Referring to the block diagram, the Argus is composed of six functional blocks: PMC interface bridge, secondary PCI bridge, dual Borealis graphics controllers, USB 2.0 controller, Stereo Audio Controller, and dual Fusion878A video digitizers.

## Dual PCI Bridge Architecture

The PLX PCI6154 Asynchronous PCI Bridge supports all PMC interfaces, from 32-bit, 33 MHz to 64-bit, 66 MHz, while enabling the local side to always operate at 32 bit, 66 MHz, which is the native interface for the graphics controllers and secondary bridge. This capability is due to the 6154's use of large internal FIFOs to decouple the primary and secondary PCI buses from each other.

A second bridge, a PLX PCI6150, is used to minimize the impact of the slower (33 MHz PCI) digitizer and USB devices by decoupling them from the primary 66 MHz local bus

## Video Inputs

The Argus provides two Conexant Fusion 878A Video Digitizers, which are single-chip solutions for NTSC and PAL composite video or S-Video capture on the PCI bus. The 878A performs on-the-fly image scaling and clipping. Its RISC-based high throughput DMA engine transfers or CPU memory via the PCI bus.

## 128-Bit Graphics Accelerator

Each display channel is powered by a Borealis graphics accelerator. With its 128-bit wide memory bus, the Borealis can draw up to sixteen 256-color pixels each memory cycle for a raw drawing speed of 2 GB/s. The drawing engine's performance is further enhanced by its display list capability, which enables it to execute lists of instructions from the CPU, rather than just one at a time. The Borealis and the host CPU can process data independently, thus breaking the lockstep which often reduces system throughput.

The display memory has 16 MB of high speed SGRAM, which provides ample local storage for the graphics image and off-screen data such as texture maps, Z-buffer, and backing store.

The Borealis uses a programmable Drawing Engine-based Look Up Table (LUT) to provide YUV to RGB color space conversion. When video data is copied from off-screen memory as part of the video image double-buffering operation, pixels can be converted on the fly to

the current display pixel format. This allows for efficient use of off-screen memory and the ability to dynamically accommodate a variety of image formats.

The Borealis can smoothly X/Y scale small RGB or YUV video clips up to full screen at any resolution and any color depth, and maintain a rate greater than 30 frames per second.

For startup support on any system expecting a VGA device on power up, the Argus graphics Channel A includes a quad image BIOS that supports VGA and FCode, with or without Sync-On-Green (SOG). Once the operating system is running, full function drivers can be loaded, allowing the Borealis's extended instruction set to be utilized.

The Borealis programmable video timing ranges from 30 to 150 Hz vertical and 15.7 to 100 kHz horizontal refresh rates, with a pixel clock up to 250 MHz, giving display formats up to 1920 x 1280 x 32 bpp.

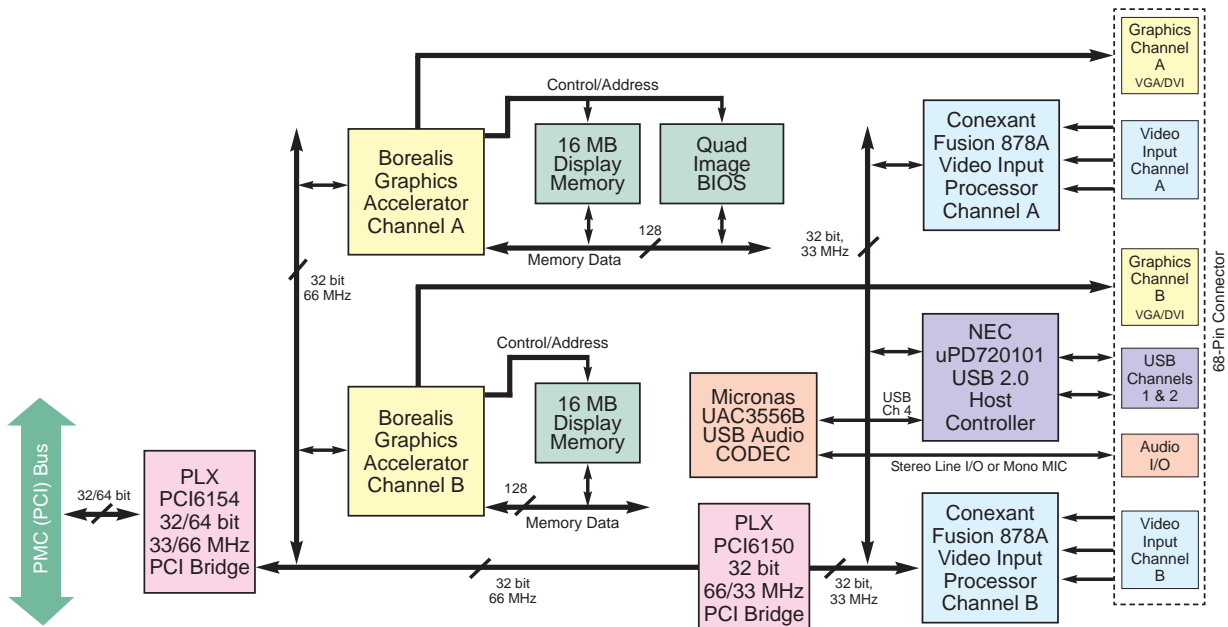
The display output is directed through an internal RAMDAC which includes a graphics cursor with a 64 x 64 x 2 bit map. It integrates the graphics and cursor pixels into 24-bit Display values (8 bits each of RGB). The analog signals from the RAMDAC are connected to a standard RGBHV (VGA) or SOG monitor. Display Data Channel lines enable the host computer to control the monitor. A separate 24-bit parallel port from the Borealis supports DVI output via a DVI encoder.

## USB 2.0 and Stereo Audio Controllers

USB 2.0 supports data rates in excess of 400 Mbit/s, making it viable for video input, external disk drives, and many other applications. USB is also useful for mouse, trackball, keyboard, and scanner. The ArgusPMC uses the NEC uPD720101 USB 2.0 host controller. As used on the Argus, two channels are available for user connections and one channel is connected to the Micronas UAC 3555B USB Stereo controller (CODEC). Controlled by the CPU via a USB port, the UAC3555B is intelligent subsystem supplies a low overhead, software compatible, full function solution. It includes Mono MIC or Stereo Line-In/Out, programmable 5-band equalizer, volume, balance, tone controls, and dynamic range.

## I/O Connections

All connections are made through the Argus front panel 68-pin high density (HD) ribbon connector and available breakout cable. The standard breakout cable splits the functions into dual VGA, dual DVI, dual USB 2.0, 3.5 mm Stereo In and Out/Mono MIN jacks, and dual S-Video/2xVin Mini-DIN connectors.



ArgusPMC Functional Diagram

# Display Formats and Output Usage

## Graphics Output Flexibility

Because there are two separate graphics controllers, each output channel is completely independent of the other. Both channels can support either VGA or DVI outputs, and in fact, one could provide VGA while the other supplies DVI.

Please contact the factory if you have a special configuration requirement. Also, refer to the User's Manual, which provides comprehensive information about connectors and cabling.

The Argus supports dual VGA (analog) outputs up to 1920x1200x32 bpp with a programmable composite sync on green.(SOG) mode. DVI capability includes resolution up to 1600x1200 and operates in single-link mode only.

The display outputs are supplied on the 68-pin front-panel connector, which requires a breakout cable that splits out into two standard DVI and two standard VGA connectors. Note that the same data is supplied on both the VGA and the DVI ports for a given display channel.

Video Mode	Resolution	Pixel Size (bits)	Windows Format	Refresh Freq. (Hz)	Output Channels	Notes
Analog Non-Interlaced	up to 1920x1200	8,16,32	WUXGA max	150 Hz at VGA, 77 Hz at WUXGA	Ch1, Ch 2	Also supports Sync On Green
Digital DVI	up to 1600x1200	8,16,32	UXGA max	60 Hz	Ch1, Ch 2	single link only

## Standard Argus VGA Display Resolutions

Resolution	Vertical Scan Rate			
	Windows and RTOS		Solaris	
	Format	Maximum	Index	Frequency
640 x 480	VGA	150+ Hz	8 9	60 Hz 75 Hz
800 x 600	SVGA	150+ Hz	6 7	60 Hz 75 Hz
1024 x 768	UVGA	142 Hz	0 1	60 Hz 75 Hz
1152 x 864	Sun	126 Hz	2 [default] 3	60 Hz 75 Hz
1280 x 1024	SXGA	107 Hz	4 5	60 Hz 75 Hz
1600 x 1200	UXGA	91 Hz	C	60 Hz
1920 x 1080	HDTV	83 Hz	n/a	n/a
1920 x 1200	WUXGA	77 Hz	D	60 Hz

## Video Input Capabilities

The ArgusPMC has two NTSC/PAL Conexant Fusion 878A video digitizers which operated independently of each other. Using the built-in DMA engine, it is even possible to transfer the video data from both digitizers into one of the on-board display channels, thus providing two independent live-video windows.

The front panel connector provides access to the S-Video input for each digitizer. With pin sharing, it can instead support up to three composite video inputs per digitizer: two inputs use the S-Video pins (but not in S-Video mode) and the third input uses the Audio Input pin. The standard breakout cable could be used for this but connector adaptation would be needed.

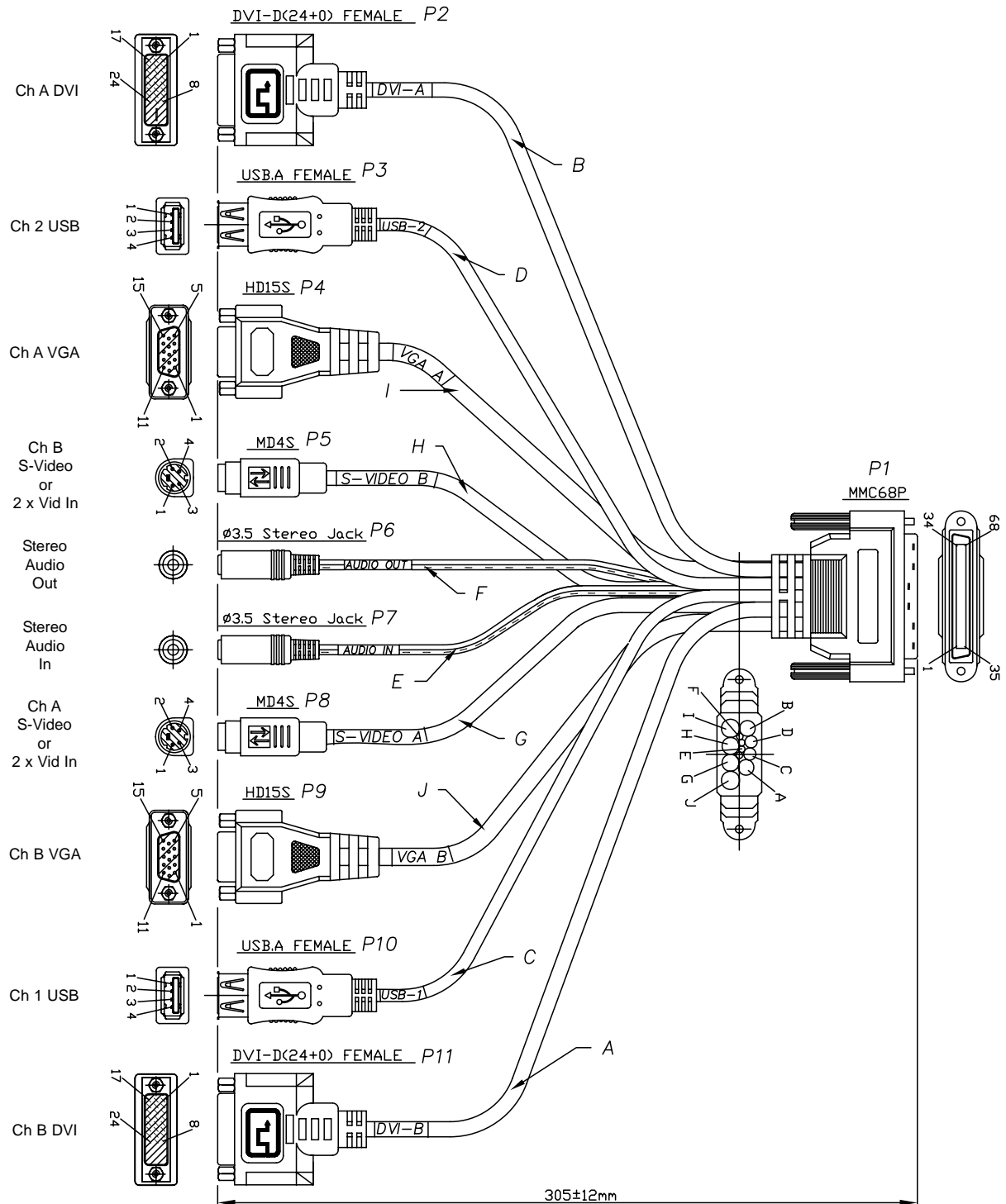
Video Mode	Resolution	Refresh Freq. (Hz)	Scan Lines	Input Multiplexer	Effective Rate MPixels/Sec	Input Channels	Clip and Scale?	Capture to Frame Buffer
NTSC SQ Pixel	640x480	30	525	1 of 3	12.27	Ch A, Ch B	yes	YUV or RGB
NTSC CCIR601	720x480	30	525	1 of 3	13.50	Ch A, Ch B	yes	YUV or RGB
PAL CCIR 601	720x576	25	625	1 of 3	14.20	Ch A, Ch B	yes	YUV or RGB
PAL SQ Pixel	768x576	25	625	1 of 3	14.75	Ch A, Ch B	yes	YUV or RGB
SECAM SQ Pixel	768x576	25	625	1 of 3	14.75	Ch A, Ch B	yes	YUV or RGB
S-Video SQ Pixel	640x480	30	525	no	12.27	Ch A, Ch B	yes	YUV or RGB
S-Video CCIR601	720x480	30	525	no	13.50	Ch A, Ch B	yes	YUV or RGB

# ArgusPMC Front Panel

Front Panel for  
ArgusPMC

MDR-68

# ArgusPMC Breakout Cable



ArgusPMC Cable A31-00734-0012 (VGX-10/1) cable assembly

# USB 2.0 and Audio Connections

## USB 2.0 Ports

The Argus uses an NEC uPD720101 USB 2.0 Controller which has five ports. The front panel connector provides access to two USB 2.0 ports (Channel 1 and 2) . The breakout cable makes these available using standard USB Type A connectors. Current limited 5V is supplied up the customary 1A.

Note that USB Channel 4 is dedicated to the USB Audio CODEC. The other 2 channels are not used on the Argus.

## Audio Input/Output

Audio functions are provided by a Micronas UAC 3555B USB Stereo CODEC, which supports either Stereo Line In/Out or

Mono MIC function, the selection of which is controlled by a user jumper on the board.

The front panel connector provides access to the inputs and outputs. The breakout cable makes these available using two 3.5 mm (“walkman”) stereo connectors.

Note that each Audio In pin is shared with a composite video input. This has no effect on the audio function and adds versatility to use of the front panel connector pins.

# Ruggedization

Rastergraf is not in the militarized business. The intent of the following table is to illustrate how the Rastergraf graphic boards fit into the standard ruggedized classes.

Rastergraf boards use standard distribution grade derated commercial temperature range or industrial temperature range components. No formal component tracking is maintained.

Spec	Air-Cooled Level 0	Air-Cooled Level 50	Air-Cooled Level 100	Air-Cooled Level 200	Conduction-cooled Level 100	Conduction-cooled Level 200
Graphics Board(s)	Argus Gemini Sirena Eclipse3 Topaz Garnet	Gemini Sirena Eclipse3 Topaz Garnet	Gemini Sirena Eclipse3 Topaz Garnet	Eclipse3 Topaz Garnet	Garnet	Garnet
Operating Temperature (4, 6)	0°C to 50°C	-20°C to 65°C	-40°C to 71°C	-40°C to 85°C	-40°C to 71°C	-40°C to 85°C
Storage Temperature	-40°C to 85°C	-40°C to 85°C	-55°C to 125°C	-55°C to 125°C	-55°C to 125°C	-55°C to 125°C
Humidity Operating	0 to 95% non-condensing	0 to 100% non-condensing	0 to 100% non-condensing	0 to 100% non-condensing	0 to 100% non-condensing	0 to 100% non-condensing
Humidity Storage	0 to 95% condensing	0 to 100% condensing	0 to 100% condensing	0 to 100% condensing	0 to 100% condensing	0 to 100% condensing
Vibration Sine (1)	2 g peak 15-2 kHz	2 g peak 15-2 kHz	10 g peak 15-2 kHz	10 g peak 15-2 kHz	10 g peak 15-2 kHz	10 g peak 15-2 kHz
Vibration Random (2)	0.01 g2/Hz 15-2 kHz	0.02 g2/Hz 15-2 kHz	0.04 g2/Hz 15-2 kHz	0.04 g2/Hz 15-2 kHz	0.1 g2/Hz 15-2 kHz	0.1 g2/Hz 15-2 kHz
Shock (3)	20 g peak	20 g peak	30 g peak	30 g peak	40 g peak	40 g peak
Conformal Coat (5)	optional	optional	optional	optional	yes	yes
Ordering Option (7)	/CA or /CS	/A5A or /A5S	/A1A or /A1S	/A2A or /A2S	/C1A or /C1S	/C2A or /C2S








## Notes:

1. Sine vibration based on a sine sweep duration of 10 minutes per axis in each of three mutually perpendicular axes. May be displacement limited from 15 to 44 Hz, depending on specific test equipment. **Shock and Vibration values are by design and not tested in production.**
2. Random vibration 60 minutes per axis, in each of three mutually perpendicular axes.
3. Three hits in each axis, both directions, 1/2 sine and saw tooth. Total 36 hits.
4. Standard air-flow is 8 cfm at sea level. Some higher-powered products may require additional airflow. Consult the factory for details.
5. Conformal coating type to be specified by customer. Consult the factory for details..
6. Temperature is measured at the card interior (not at edge) using on-board LM75 temperature monitor.
7. Last letter in ordering option: A for Acrylic Conformal Coating, S for Silicone Conformal Coating

# Graphics Software Support

SDL Subroutine Library includes video capture and Built-In Self Test modules  
 WindML including video input extensions (requires SDL)  
 Accelerated X Server with OpenGL and Xv video input extensions  
 Windows 2K/XP drivers including accelerated DirectX, OpenGL  
 Audio and USB 2.0 support

## Software Support Matrix

	SDL		DirectX 7	Self-Test using SDL	Multi-Head	OpenGL	x86 BIOS	xSun and OpenGL DDX	Test S/W using SunVTS	SPARC FCode	USB and Audio
<b>Solaris SPARC 32/64-bit</b>					✓			✓	✓	✓	✓
<b>Solaris x86</b>		✓	✓		✓	✓	✓				✓
<b>VxWorks x86/PowerPC</b>		✓		✓	✓		✓				
<b>Windows 2K/XP</b>			✓		✓	✓	✓				✓
<b>Linux x86/PowerPC</b>		✓	✓	✓		✓	✓				
<b>LynxOS PowerPC</b>		✓	✓			✓					

## SDL Graphics Library

SDL is a graphics library designed to be a device-independent programming interface. SDL is ideally suited to demanding board level and embedded systems applications. Drivers are available for selected host CPU boards and operating systems. SDL is supplied in object library format, which means that its target code size can be controlled by limiting the number of functions used in a given application. SDL has been designed to run on any CPU and operating system that uses linear addressing and is supported by the GNU C compiler and linker.

SDL is easy to use. It includes a complete set of graphics primitives that interface to the Borealis graphics controller's accelerated functions. All graphics primitives are drawn as single pixel lines. Rectangles, polygons, circles, ellipses, and chords can be filled with a solid color or stipple patterns.

Complete information about SDL is contained in the Standard Drawing Library C Reference Manual that is available for download from our web site at <http://www.rastergraf.com>.

### SDL Feature Summary

- Solid (thin and wide) and dashed lines, polylines, and rectangles
- Pixblits to/from the display and host memory
- Filled and hollow polygons, ellipses, circles, sectors, and chords
- Solid and Pattern Fills - Pixel Processing
- Proportional and Fixed Width Fonts
- Clipping Rectangle and Logical Origin
- VGA output 640x480 to 1920x1200
- DVI output 640x480 to 1600x1200
- 8/16/24 bpp
- Sync On Green and Composite Separate Sync outputs
- Video Capture - NTSC/PAL, S-Video

# Product Specifications

<b>Graphics Controllers</b>	Borealis, 32-bit, 33/66 MHz PCI 2.1
<b>Maximum Dot Clock</b>	250 MHz
<b>Horizontal Scan Rates</b>	31.5 to 115 kHz
<b>Display Memory</b>	16MB or 32MB SGRAM
<b>Display Colors</b>	16.7 Million @ 24 bits (uses a full 32-bit word) 65,536 @ 16-bits, 256 @ 8-bits
<b>PCI-PCI Bridge</b>	PLX PCI6154: 32/64-bit, 33/66 MHz (PMC side) 32-bit, 66 MHz (local side)
<b>USB 2.0 Controller</b>	NEC uPD720101, EHCI/OHCI, USB 2.0/1.1
<b>Audio Controller</b>	Micronas UAC3556B USB Stereo Audio CODEC
<b>Video Digitizers</b>	Conexant Fusion 878A, DMA, 4 input
<b>VPD Serial EEPROMs</b>	2 Kb each for USB, Bridges, and Digitizers
<b>Environment</b>	Temperature: 0°C to +55°C, operating, -55°C to +85°C, storage Humidity: 5% - 95% non-condensing
<b>Power Requirements</b>	+5V $\pm$ 5%, 0.9 A (Max.) +3.3V $\pm$ 5%, 2.4 A (Max.)  Measurements do not include 5V power sourced to Ch 1 & Ch 2 VGA/DVI (limited to 1A total) or the USB auxiliary power pins (each limited to 1A).
<b>PCI Compatibility</b>	32/64-bit, 33/66 MHz, PCI 2.2 compliant Universal PCI Bus signaling (5V and 3.3V)
<b>Standards Compatibility</b>	IEEE 1386-2001 (PMC)
<b>Dimensions</b>	149 mm x 74 mm
<b>PCI Device IDs and Interrupts</b>	6154 Bridge: IDSEL = PMC IDSEL Borealis Ch A: IDSEL = 6154_AD17, INTA Borealis Ch B: IDSEL = 6154_AD18, INTB Fusion 878 Ch A: IDSEL = 6150_AD16, INTC Fusion 878 Ch B: IDSEL = 6150_AD17, INTD USB: IDSEL = 6150_AD20, INTA LM75: INTB
<b>Front Panel Connector</b>	68-pin 3M N10268-52E2VC Mini-D ribbon, which supplies:  Graphics: 2x DVI-D 2x VGA USB: 2x USB Type A Video In: 2x S-Video Mini-DIN Audio I/O: 2x 3.5mm stereo jacks
<b>Analog Monitor Support</b>	Standard multi-frequency VGA compatible mon- itors supports resolutions up to 1920x1200. Sync-On-Green (SOG) is jumper selectable.
<b>Composite Video Signal</b>	1 Volt peak to peak, consisting of: 660 mV Reference White 54 mV Reference Black 286 mV Sync
<b>Analog Flatpanel Support</b>	VGA compatible, up to 1920x1200.
<b>Digital Flatpanel Support</b>	DVI, up to 1600x1200.
<b>Quad-Image BIOS</b>	Allows board to function as system console on x86 (VGA/DVI), SPARC (FCode), and Sync- On-Green monitor-based systems.
<b>Maintenance Features</b>	DDC-2B control enables system software to inter- rogate monitor for type and capabilities; RAMDAC 1-bit ADC sense function can detect monitor con- nections; RAMDAC's integral CRC capability allows any 24 video data lines to be tested; LM75 thermal sensor can report board temp..
<b>Power-management capabilities</b>	Depending on operating system support, most devices can be at least partially powered down.

# Ordering Information

## ArgusPMC

High performance graphics controller provides two Borealis Graphics Accelerators, 16MB SGRAM per channel, VGA and DVI graphics outputs, two Conexant Fusion 878A video digitizers, NEC uPD720101 USB 2.0 host controller, and Micronas UAC3556B Stereo Audio Controller (CODEC). Quad-image BIOS supports VGA, DVI, RGB+Sync-On-Green, and FCode.

Argus Part Number

**AD6-00729-C501** ArgusPMC Dual Display & Video-in, 16MB SGRAM & USB/channel, Stereo Audio

/GL

OpenGL license per board

## Breakout Cable:

**A31-00734-0012** VGX-10/1 Cable - ArgusPMC to a set of 2x USB, 2x DVI, 2x VGA, 2x S-Video, and 2x 3.5mm stereo jacks. 1 ft.(30 cm)

## Software:

### SDL/R3.6.5

SDL graphics library for x86/PPC VxWorks, x86/PPC Linux, and PPC LynxOS.

### WML/R1.2

WindML for for WindML 3.0 for x86/PPC VxWorks. Requires SDL.

### Windows Drivers

Drivers for Windows 2K/XP.

Downloadable from [www.rastergraf.com](http://www.rastergraf.com)

### DRV/LN/B/R3.0

2D accelerated X-Windows DDX drivers for x86 and PPC Linux and x86 Solaris. Supports XFree86 4.x and X.org X11R6.8.2. X11R7.x available Q2 2008.

### LYX/B/R1.3

2D accelerated X-Windows DDX drivers for LynxOS 4.0

### DDX/SO/R5.0

2D X-Windows DDX drivers for SPARC Solaris 2.6-10.

### GL/SO/R1.2

One license per board - serial number controlled.

High Performance Direct Rendering Infrastructure (DRI) based hardware accelerated 3D/OpenGL DDX driver for SPARC Solaris 2.6-10. Requires DDX/SO/R5.0

### VIN/SO/R1.2

Video capture driver, Solaris 2.6 - 10

### SunVTS R3.0

Support SunVTS 6.1 for x86 and SPARC Solaris 2.6-10. For SPARC Solaris, also requires DDX/SO/R5.0.

**NOTES:** /RX.X is software revision number, subject to change.

Solaris x86 support requires Solaris 9 or newer.

# [www.rastergraf.com](http://www.rastergraf.com)

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