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.
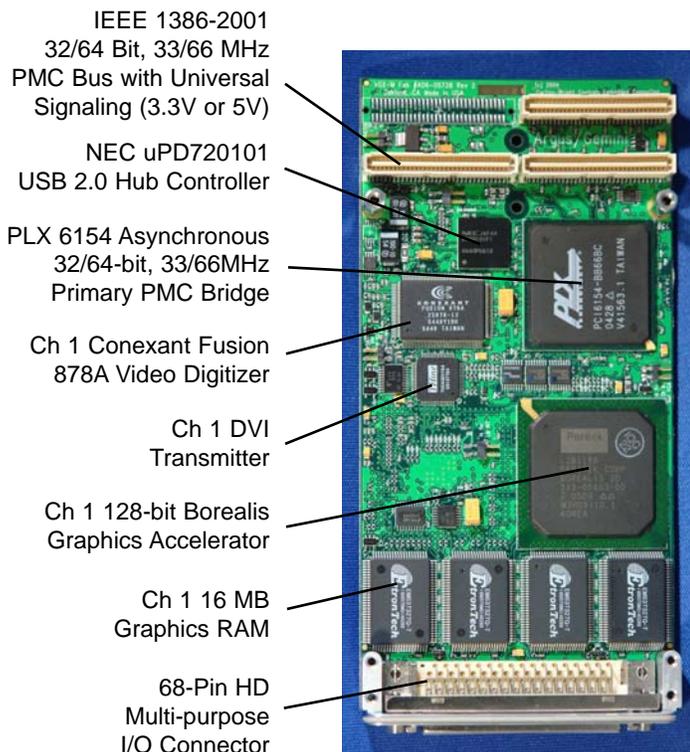
Embedded Life-Cycle Support

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.
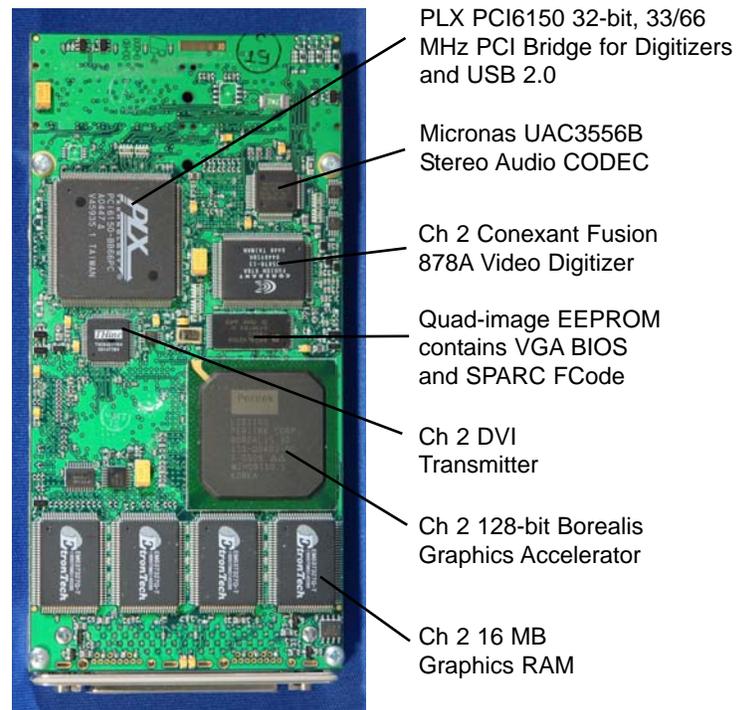
The Embedded Graphics Source.

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.*.

IEEE 1386-2001
32/64 Bit, 33/66 MHz
PMC Bus with Universal
Signaling (3.3V or 5V)

NEC uPD720101
USB 2.0 Hub Controller

PLX 6154 Asynchronous
32/64-bit, 33/66MHz
Primary PMC Bridge

Ch 1 Conexant Fusion
878A Video Digitizer

Ch 1 DVI
Transmitter

Ch 1 128-bit Borealis
Graphics Accelerator

Ch 1 16 MB
Graphics RAM

68-Pin HD
Multi-purpose
I/O Connector

Top View

PLX PCI6150 32-bit, 33/66
MHz PCI Bridge for Digitizers
and USB 2.0

Micronas UAC3556B
Stereo Audio CODEC

Ch 2 Conexant Fusion
878A Video Digitizer

Quad-image EEPROM
contains VGA BIOS
and SPARC FCode

Ch 2 DVI
Transmitter

Ch 2 128-bit Borealis
Graphics Accelerator

Ch 2 16 MB
Graphics RAM

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 capabililty, 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 color 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 UAC3556B 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.
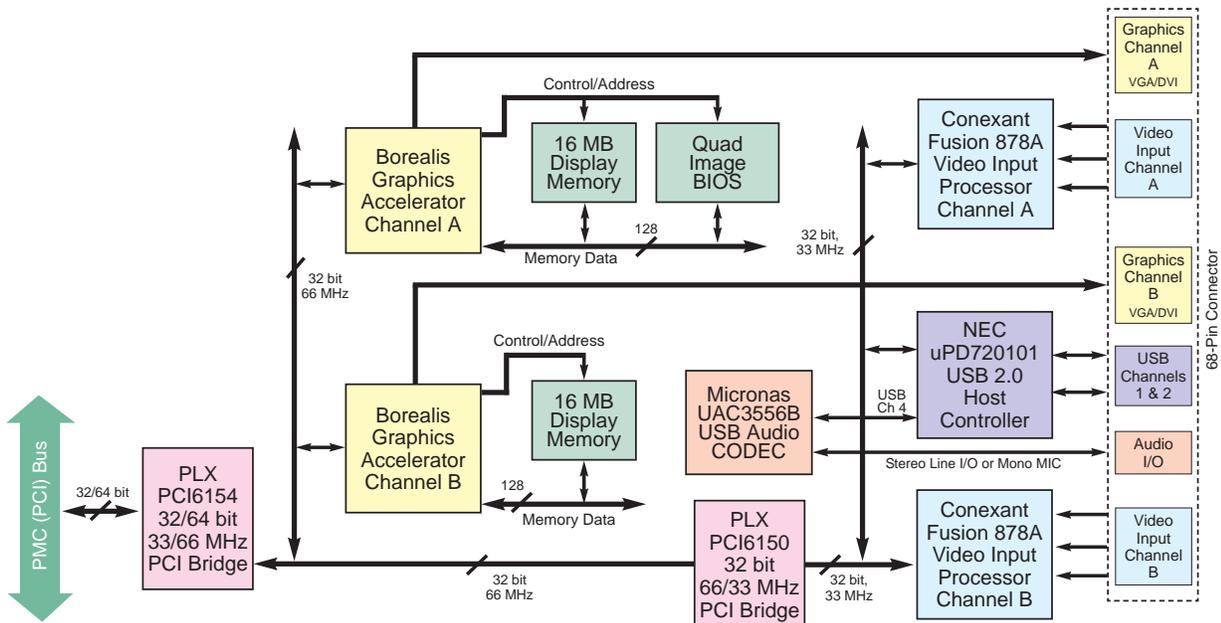
ArgusPMC Functional Diagram

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