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Rastergraf

SirenaPMC

High Resolution Graphics Controller with Video Digitizer, USB 2.0, and Audio for PMC

Solaris ■ Windows ■ Real-Time Operating Systems ■ Linux



Features

- Functions as a multi-media controller
- 128-bit graphics controller provide no-compromise drawing engine performance at up to 1920 x 1200 (VGA) or 1600 x 1200 (DVI)
- 16 MB or 32 MB display memory
- Video digitizer
- USB-2.0 Host controller
- Stereo Audio controller (CODEC)
- Standard front panel connectors
- VxWorks, Linux, LynxOS, Solaris and Windows 2K/XP

SirenaPMC

Rastergraf's SirenaPMC fulfills high performance requirements for a complete 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 the 128-bit Borealis graphics accelerator, the Sirena supports 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 Sirena to operate in virtually any x86 or SPARC system using VGA, Sync-On-Green, or DVI displays.

Other features include a Conexant Bt878A video digitizer, a Philips ISP1561 USB 2.0 host controller, and Micronas UAC3555B USB Stereo Audio CODEC.

The PCI bridge supports all PMC interfaces from 32-bit, 33 MHz PCI to 64-bit, 133 MHz PCI-X. The local bus runs at 32-bit, 66 MHz if the Borealis is installed and at 32-bit, 33 MHz when the USB and/or Bt878A are installed (because they are 33 MHz devices).

Embedded Life-Cycle Support

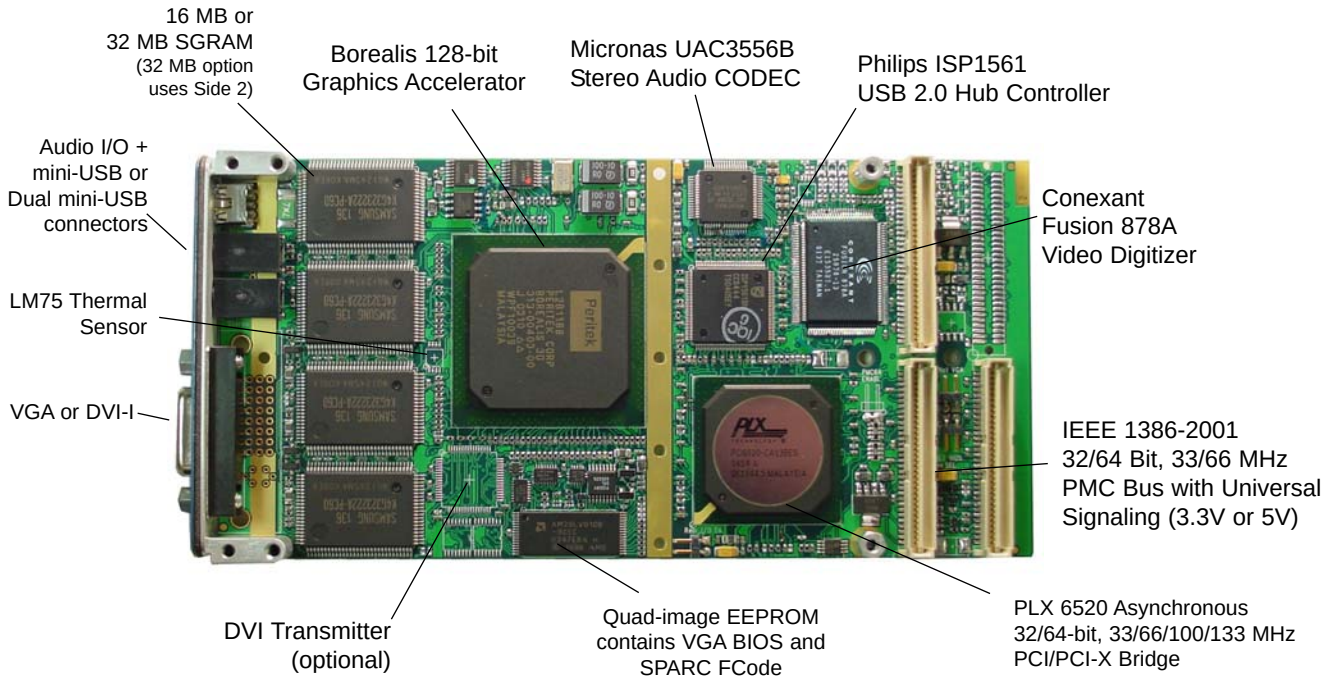
Rastergraf's comprehensive selection of PMC, CompactPCI, PCI, and VME display and carrier solutions are designed to satisfy the product life-cycle requirements demanded by the embedded computing market.

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*..



Features

- Borealis 128-bit 2D/3D graphics controllers
- 33/66/133 MHz, 32/64-bit PCI/PCI-X interface
- Display programmable for 8, 16, or 32 bits/pixel
- 16 MB or 32 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
- USB 2.0 host controller
- Multi-input Video Digitizer
- Thermal sensor allows monitoring of board temperature
- USB, Digitizer, & Bridge have Vital Product Data EEPROMs
- Dual channel version (Argus)
- Single (Eclipse3) and dual (Gemini) display-only versions
- Can be used with Rastergraf PCI and CompactPCI carriers

SirenaPMC Technical Overview

Introduction

The Rastergraf SirenaPMC is a PMC (PCI Mezzanine Card) multifunction display controller. Referring to the block diagram, the Sirena is composed of five functional blocks: PMC interface bridge, Borealis graphics controller, USB 2.0 controller, Stereo Audio Controller, and a video digitizer.

PCI Bridge

The PLX 6520 Asynchronous PCI/PCI-X Bridge supports all PMC interfaces, from 32-bit, 33 MHz to 64-bit, 133 MHz. The local side always operates at 32 bit, 33 MHz unless only the Borealis is installed, in which case it operates at 32-bits, 66 MHz, because the digitizer and USB controller run at 33 MHz.

Video Input

The Sirena/PMC provides a Conexant Bt878A Video Digitizer, which is a single-chip solution for NTSC, PAL, or SECAM composite video or S-Video capture on the PCI bus. It performs on-the-fly image scaling and clipping. Its RISC-based high throughput DMA engine transfers video data to Borealis or CPU memory via the PCI bus.

128-Bit Graphics Accelerator

The Sirena/PMC graphics display 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 or 32 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 Sirena 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.

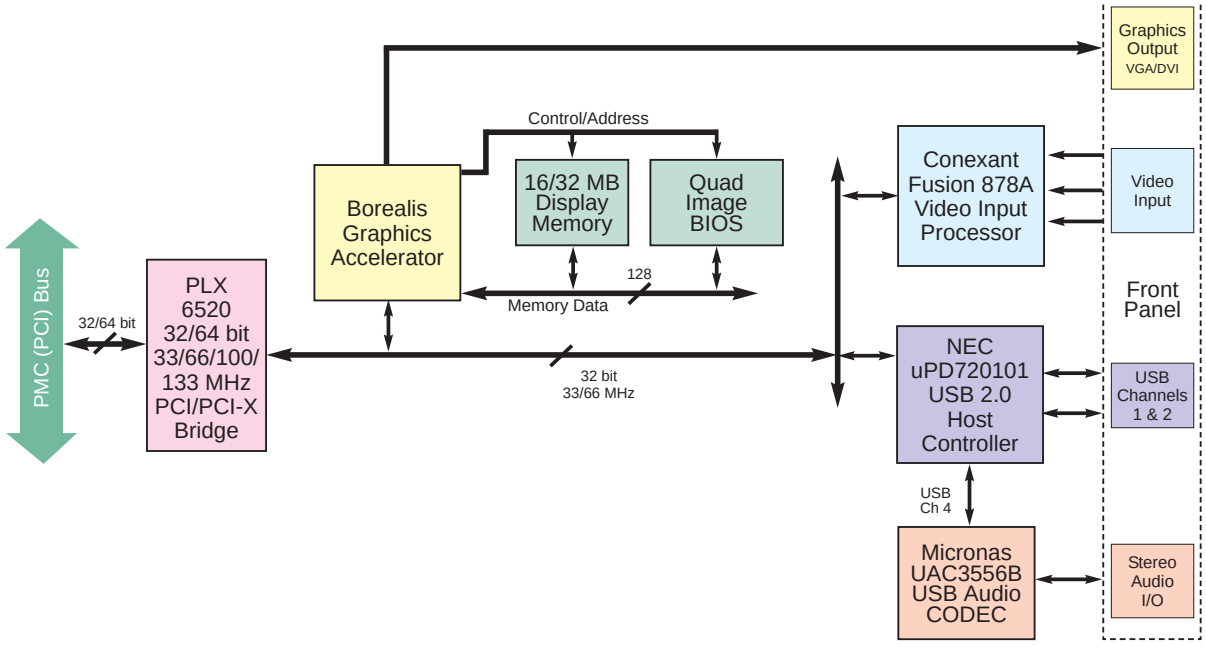
The display output is directed through an internal RAMDAC which includes a graphics cursor with a 64 x 64 x 2 bit map. It integrates the graphics and cursor pixels into 24-bit color values (8 bits each of RGB). The analog signals from the RAMDAC are connected to a standard RGBHV (VGA) or SOG monitor. 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 SirenaPMC uses the Philips ISP1561 USB 2.0 host controller. As used on the Sirena, 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

Graphics are supplied either through an standard VGA connector or a DVI-I VGA/DVI connector. Analog video inputs use spare pins on the DVI-I connector. A breakout cable splits the functions into DVI-I (for both DVI and VGA) and video inputs. USB is supplied through two mini-Type A connectors. Audio in and out are supplied through 3.5mm stereo jacks.



SirenaPMC Functional Diagram

Display Formats and Output Usage

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 Sirena supports a VGA (analog) output 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 front-panel using either a VGA or DVI-I connector. Note that the DVI-I supplies both VGA and DVI). Also, the same data is supplied on both the VGA and the DVI ports.

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

Standard Sirena 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 Sirena provides a Conexant Bt878A Video Quad-input Digitizer which is a single-chip solution for Composite (RS-170), NTSC, PAL, or SECAM composite video or S-Video capture on the PCI bus.

Video input signals is accessed via spare pins on the front panel DVI-I connector and an available breakout cable. The connector accesses video inputs MUX0, MUX1, MUX2, and CIN. MUX0 and CIN are used for S-Video.

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

Configurations

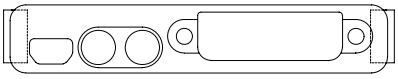
The Sirena/PMC is available in several standard configurations which are summarized in the table below. For custom configurations, please contact Rastergraf for more information.

For the SirenaPMC/DUA, multiple functions are allocated to the DVI-I. Pins that would be used for dual-link DVI, which the Sirena doesn't support, are reassigned to support Video Inputs and USB Ch 2.

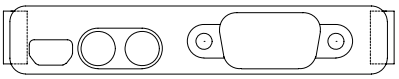
Sirena Version	Use Breakout Cable(s)	Video Connector	VGA out	DVI out	Composite/ S-Video/ NTSC/PAL In	Audio In/Out	USB Ch 1	USB Ch 2
SirenaPMC/DUA	DVI: A31-00749-1012	DVI	DVI-I	DVI-I	DVI-I	dual 3.5 mm	Mini AB	DVI-I
SirenaPMC/DUC	Standard Cables	DVI	DVI-I	DVI-I		dual 3.5 mm	Mini AB	DVI-I
SirenaPMC/VUA	Standard Cables	VGA	VGA			dual 3.5 mm	Mini AB	

SirenaPMC Front Panels

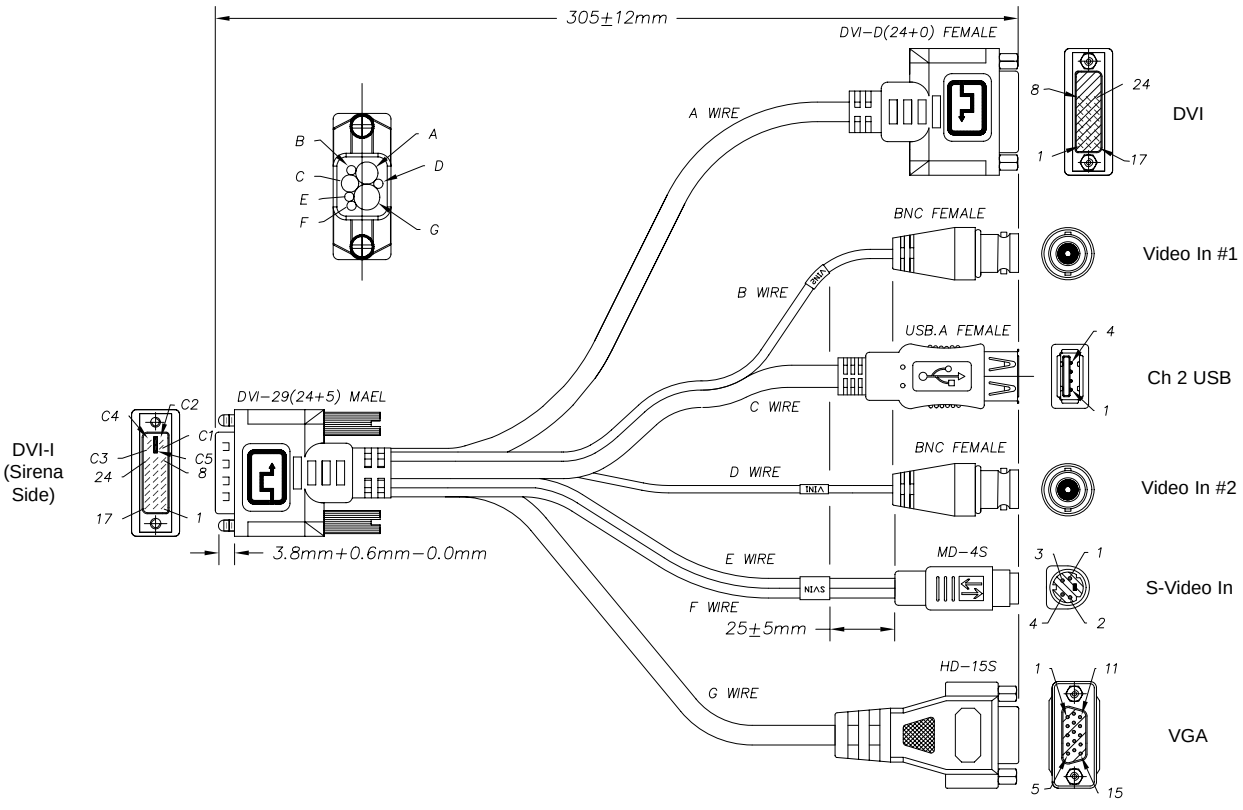
Front Panel for SirenaPMC/DUx



Front Panel for SirenaPMC/VUA



SirenaPMC Breakout Cable



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